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7 November 2003

Mr. Mazin Enwiya
Work Assignment Manager
U.S. Environmental Protection Agency - Region V
77 West Jackson Blvd.
Chicago, Illinois 60604

U.E. EPA Contract No. 68-W7-0026
Work Assignment No. 155-RICO-B51W
Document Control No. RFW155-2A-AOHC

Re: Revised Site Management Plan and Sampling and Analysis Plan
Ellsworth Industrial Park Site
Downers Grove, Illinois

Dear Mr. Enwiya:

Weston Solutions, Inc. (WESTON®) has enclosed three copies of the revised Site Management Plan and Sampling and Analysis Plan (SAP) for the above referenced site. Revisions and modifications are based on comments on the draft documents received from U.S. EPA in your letter dated 27 October 2003, as well as scope of work modifications discussed during our 21 October site visit. The following paragraphs provide a summary of the comments, responses, and modifications:

Quality Assurance Project Plan

Comment 1, Page A1: *Warren Layne should be named as U.S. EPA Region V Quality Assurance Reviewer.*

> Response: Warren Layne is identified as the U.S. EPA Region V Quality Assurance Reviewer on the signature page of the QAPP.

Comment 2, Page A12: *Please explain why "existing permanent monitoring wells will not be sampled during this data collection" when from Figure 4-12 it seems that there are numerous overburden wells that were previously sampled in 2001. Could the sampling of these wells yield information about the extent of attenuation of the migration of VOCs detected from the previous study?*

Response: Pursuant to our earlier discussions and your e-mail dated 5 November 2003, sampling of existing monitoring wells will not be conducted during this phase of investigation activities. No changes have been made to the document at this time.

Comment 3, Page A22: *Please add appropriate Analytical Laboratory Personnel.*

Response: The CLP and CRL laboratories have been added to the project organization chart communications lines. However, as we discussed, personnel will not be identified until a CLP laboratory has been assigned to the project just prior to field work.

Comment 4, Page B1: *Please explain the phrase "as graduated volumes permit."*

Response: The text has been modified to indicate that field parameter stabilization measurements will be collected after grab groundwater sampling if sufficient groundwater is available.

Comment 5, Page B2: *Please replace "refrigerator" with "freezer."*

Response: The requested modification has been incorporated.

Comment 6, Page B12, A: *What is the rationale for the selection of these compounds? It seems to me that there is enough sites and potential environmental releases of compounds described in Section 1, where there is little or nothing known about the on-site chemicals; for example; the alleged dumping of unknown chemicals in the woods referred to on Page 14 of Section 1 of the QAPP, the lubricating oils described on Page 7 of 23, which may contain SVOCs, and an on-site dump. There are also several other facilities where little or no chemical use information exists, that perhaps it would be better to screen for all analytes such as VOCs, SVOCs, PCBs, Dioxins, Polycyclic Aromatic Hydrocarbons (PAHs), and RCRA metals including mercury and CR(VI).*

Response: Pursuant to our earlier discussions and your e-mail dated 5 November 2003, analysis of compounds other than VOCs will not be conducted during this phase of investigation activities. No changes have been made to the document at this time.

Comment 6, Page B12, B: *Note that if during the process of conducting the approved analyses for VOCs and SVOCs, tentatively identified compounds (TICs) are identified and estimated in quantity, Section IV of the presently effective Unilateral Administrative Orders require submission of "all results of sampling and tests and all other data received." To satisfy this requirement, the analytical* *results on the TICs must be provided.*

> Response: The test has been modified to indicate that all analytical data reported, including TICs, will be reported in accordance with the referenced document.

Draft Site Management Plan and Sampling and Analysis Plan

Section 4.3.1.1, Soil Boring, Downhole Logging, and Sampling: *The soil boring sampling plan indicates soil samplers to be used are Macro cores. Will the closed piston system be used? Depending upon the sampling depth, Macro cores may scrape soil from the borehole wall or if the borehole has collapsed, (as indicated may happen in the paragraph on borehole abandonment) the Macro core will collect the soil that has collapsed from an unknown depth. Using the dual tube system of soil collection will keep the borehole from collapsing during sampling.*

> Response: The text has been modified to indicate that the open Macro core sampler will only be used if sampling is conducted in the upper four feet. Sampling at depths below four feet will be accomplished using the Macro core closed piston system to ensure samples are collected from the desired horizon.

Section 4.3.2.1, Groundwater Sampling During Drilling: *The second type of sampling devices mentioned are disposable bailers. The use of bailers is not the preferred method of collecting groundwater samples for Volatile Organic Compounds (VOCs). A bladder pump should be considered as a backup for the peristaltic pump.*

> Response: The text has been modified to indicate that in the event that the peristaltic pump proves ineffective due to sample depth or lack of recharge, a bladder pump will be utilized. In the event that the bladder pump also proves ineffective due to insufficient groundwater recharge or silty conditions, a bailer will be used as a last resort.

Modifications Based on 21 October Site Visit

In accordance with our discussions during the 21 October 2003 site visit, two additional boring locations have been added to the Flexible Steel property and two additional borings have been added to the Former WWTP property within the former lagoons. Sample boring designations and sample numbers (soil and groundwater) have been modified throughout the document to reflect these additions.

WESTON SOLUTIONS

Please contact me at (847) 918-4016 if you have questions or require further information.

Very truly yours,

Weston Solutions, Inc.

Kurt T. Fischer, P.G.
Site Manager

KF\tg

Enclosure

ELLSWORTH INDUSTRIAL PARK SITE
DOWNERS GROVE, ILLINOIS

PHASE I

SITE MANAGEMENT PLAN AND
SAMPLING AND ANALYSIS PLAN

REVISION 1 – 7 November 2003

WORK ASSIGNMENT NO. 155-RICO-B51W

Prepared for:

U.S. Environmental Protection Agency
77 West Jackson Boulevard
Chicago, Illinois 60604

Revision 0 – 8 October 2003 – Document Control Number RFW155-2A-AOBN
Revision 1 - 7 November 2003 - Document Control Number RFW155-2A-AOHC

Prepared and Approved By:	Kurt Fischer, P.G. Site Manager	Date: 11/7/03
Approved By:	James M. Burton, P.E. Program Manager	Date: 11/7/03
Approved By:	Brenda Lewis Administrative Support Manager	Date: 11/7/03

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AOC	Analytical Operations/ Data Quality Center
CAS	Chemical Abstract Service
CERCLA	The Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CGI	Combustible Gas Indicator
CLP	Contract Laboratory Program
COC/TR	Chain of custody/traffic report
CPR	Cardiopulmonary resuscitation
CPT	Cone Penetration Test
CRL	Central Regional Laboratory
1,2-DCA	1,2-Dichloroethylene
DCN	Document Control Number
DMP	Data Management Plan
DOT	U.S. Department of Transportation
DQO	Data quality objectives
EC	Electrical Conductivity
EDD	Electronic deliverable document
EDR	Environmental Data Resources
EPA	Environmental Protection Agency
EquIS	Environmental Quality Information Systems
ESA	Environmental Site Assessment
FORMS II Lite	Field Operations and Record Management System
FS	Feasibility Study
FSP	Field Sampling Plan
FSS	Field Services Section (of U.S. EPA)

GC/MS	Gas chromatograph/mass spectrophotometer
GC	Gas chromatograph
GPS	Global Positioning System
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
IATA	International Air Transport Association
IDW	Investigative Derived Waste
IEPA	Illinois Environmental Protection Agency
in.	Inches
LCS	Laboratory Control Samples
LCSD	Laboratory Control Spike Duplicate
MCL	Maximum Contamination Limit
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
ug/kg	micrograms per kilogram
ug/L	micrograms per liter
MIP	Membrane Interface Probe
MS/MSD	Matrix spike/matrix spike duplicate
NIST	National Institute of Standards
OSHA	Occupational Safety and Health Administration
OVA	Organic Vapor Analyzer
OVM	Organic Vapor Meter
PCE	Tetrachloroethylene
PE	Performance Evaluation
% R	Percent Recovered
ppb	Parts per billion
ppm	Parts per million
QA/QC	Quality Assurance/Quality Control

QA	Quality Assurance
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QC	Qaulity Control
RAC	Response Action Contract
RAS	Routine Analytical Services
RI	Remedial Investigation
RPD	Relative percent difference
RPM	Remedial Project Manager
RSCC	Region V Sample Control Coordinator
RSD	Relative standard deviation
RSO	Regional Safety Officer
SA	Site Assessment
SDG	Sample Delivery Group
SDRs	Sample Discrepancy Reports
SHSC	Site Health and Safety Coordinator
SMC	Sample Management Coordinator
SMP	Site Management Plan
SOPs	Standard Operating Procedures
SOW	Statement of Work
1,1,1-TCA	1,1,1-Trichloroethane
TCE	Trichloroethylene
USTs	Underground Storage Tanks
VOCs	Volatile Organic Compounds
WAM	Work Assignment Manager
WESTON	Weston Solutions, Inc.
WWTP	Waste Water Treatment Plant

SECTION 1
INTRODUCTION

WESTON has prepared this document for the United States Environmental Protection Agency (U.S. EPA) for the site known as the Downers Grove Groundwater Investigation Site, also referred to as the Ellsworth Industrial Park site, in Downers Grove, DuPage County, Illinois. Figure 1-1 is a site location map. This document consists of a Site Management Plan (SMP), Field Sampling Plan (FSP), Quality Assurance Project Plan (QAPP), and the Data Management Plan (DMP). Together, the FSP, QAPP, and DMP represent the Sampling and Analysis Plan (SAP). The project plans contained herein were prepared under agreement with the U.S. EPA Contract No. 68-W7-0026 as described in the approved Remedial Investigation/Feasibility Study (RI/FS) Work Plan (Revision 1) dated 28 July 2003 (WESTON, 2003).

1.1 OBJECTIVES

The investigation activities described in this document are being performed as Phase I of a RI/FS for the Ellsworth Industrial Park site. The objective of Phase I RI/FS activities is to conduct further screening work at additional properties both within and outside the Ellsworth Industrial Park boundaries to identify other potential properties that may have contributed to the groundwater contamination associated with the site. Data and information gathered during this phase, in combination with previously gathered data, will provide a basis for development of a detailed RI/FS work plan at a future date. These detailed RI/FS activities will be carried out in subsequent phases to provide and evaluate information to support an informed risk management decision regarding the most appropriate remedy for the site.

Phase I activities will investigate the presence and nature of volatile organic compound (VOC) contamination in soil and shallow groundwater at 28 selected properties, for which historical data and information compiled by the U.S. EPA and others have shown a potential for chlorinated solvent use. These properties are in addition to those previously identified and investigated during U.S. EPA and Illinois Environmental Protection Agency (IEPA) Site Assessment (SA) activities. Table 1-1 summarizes the 28 properties to be investigated as part of the Phase I RI/FS and Figure 1-2 shows the property locations and approximate property boundaries.

Weston Solutions, Inc. (WESTON) will furnish necessary personnel, materials, and services needed for, or incidental to, performing the Phase I RI/FS activities described in this document, except as otherwise specified herein.

1.2 DOCUMENT ORGANIZATION

Section 1 of this document provides the objectives and a summary of applicable background data and information. The SMP for the project can be found in Section 2. The SMP describes how site access, security, contingency procedures, management responsibilities, and investigative-derived waste will be managed. Section 3 consists of the FSP, which includes the investigation scope of work, summary tables of the field activities, chain-of-custody/field documentation procedures, sample packaging and shipping procedures, quality control issues, etc. Section 4 is the QAPP. Prepared in accordance with U.S. EPA QA/R-5, the QAPP describes the project objectives and organization, functional activities, and quality assurance/quality control (QA/QC) protocols that will be used to achieve the desired data quality objectives (DQOs). Section 5 is the DMP, which specifies the procedures for storing, handling, accessing, and securing data collected during the RI. Laboratory electronic data deliverable (EDD) formats are also discussed in the DMP.

1.3 BACKGROUND AND SITE HISTORY

The following discussion of site background and history was compiled from U.S. EPA-provided file review data and information and the Draft Records Compilation Report (Techlaw, 2003).

1.3.1 Site Location

The Downers Grove Groundwater Site is located in Downers Grove, DuPage County, Illinois. The site encompasses the area in which chlorinated-solvent contamination has been detected in groundwater. The approximate boundaries of the site are Burlington Avenue to the north, 63rd Street to the south, Lee and Springside Avenues to the east, and Interstate 355 (I-355) to the west. The site consists of residential, recreational, and commercial/light industry properties. The Ellsworth Industrial Park is located in the northern portion of the site, and it is within this area that the source(s) of the groundwater contamination is suspected. The Ellsworth Industrial Park is bordered on the north by Burlington Avenue; on the south by Elmore and Inverness Avenues; on the east by Belmont Avenue; and on the west by I-355.

1.3.2 Previous Investigations

Between spring and fall 2001, the IEPA performed a groundwater investigation on the east side of I-355 near Downers Grove in response to citizen concerns related to recent private-well sampling in neighboring Lisle. The investigation consisted of three rounds of residential-well sampling throughout the area. Approximately 495 private wells were sampled and analyzed for levels of volatile organic chemicals (VOCs). Sample results indicated elevated levels of PCE, TCE, and other related VOCs. Approximately 52% of the samples collected during Round 1 and Round 2 contained

PCE or TCE above 5 parts per billion (ppb) (the federal drinking-water standards and the State of Illinois Maximum Contamination Limit [MCL]).

In response to these findings, the IEPA performed a cone penetration test (CPT) investigation within the Ellsworth Industrial Park (Parsons, 2001). The investigation used a CPT rig to log the shallow lithology in the area and collect groundwater samples at a variety of depths above the bedrock in order to evaluate the source area(s) of the chlorinated solvent releases. The area of investigation included only the southern and southeastern-most portions of the industrial park along portions of Wisconsin, Elmore, and Inverness Avenues. During the investigation, 28 groundwater samples were collected from 27 separate sampling locations within the industrial park. Of the 28 groundwater samples, one sample was found to contain TCE.

In February 2002, U.S. EPA and IEPA conducted Phase I SA activities at selected locations within the industrial park. The IEPA conducted boring and sampling activities using a Geoprobe unit outfitted with a membrane interface probe (MIP) for soil logging and sample collection. U.S. EPA performed a follow-up CPT investigation throughout the industrial park and selected areas east of the park. The CPT rig was used to advance stratigraphy borings, which defined the geology at each location as well as identified the presence of water-bearing zones within the unconsolidated overburden. Each boring was advanced to refusal, which ranged from approximately 12 to 80 feet bgs. A total of 44 locations were advanced using the CPT and Geoprobe MIP technology. Once the stratigraphy was characterized and the water-bearing zones were identified, depth intervals were selected for groundwater sampling. A total of 37 investigative groundwater samples were collected. Chlorinated solvents, including 1,1,1-TCA, PCE, TCE, and their common degradation products, were detected at several locations and at various concentrations within the industrial park. The highest concentrations were generally found to be present along Curtiss Street between Chase Street and Katrine Avenue. TCE was detected in shallow groundwater in this area at concentrations up to 218 microgram per liter (ug/L). The presence of TCE and PCE in shallow groundwater provided a potential link between source(s) in the industrial park and contamination observed in residential wells downgradient of the site.

Based on the results of the Phase I SA, a Phase II SA was undertaken as a joint effort between U.S. EPA and IEPA to further characterize chlorinated solvent contamination in soil and groundwater and identify potential sources. Prior to field investigation activities, efforts were undertaken to gather and evaluate existing data and information on properties and businesses within the industrial park. This information was used to focus field investigative efforts on likely chlorinated solvent source facilities based on past and present use of these chemicals. In addition to focused investigation at specific facilities, a network of groundwater monitoring wells was also installed throughout the industrial park to begin evaluating site hydrogeologic characteristics.

The results of the Phase II SA indicated that PCE and TCE were present at numerous and widespread locations and depths within the Ellsworth Industrial Park in soil at concentrations up to 500,000 ug/Kg, indicating the presence of probable source facilities nearby. PCE and TCE were also detected in groundwater in both glacial drift and bedrock aquifers at concentrations up to 190 ug/L. By comparison, the highest PCE/TCE concentrations observed in residential wells south of the site were typically around 15 ug/L. These data indicate that PCE/TCE appears to be migrating from source facilities within the industrial park through overburden soil, entering the bedrock aquifer system, and migrating in a downgradient direction towards the affected residences.

1.3.3 Summary of Existing Information and Records Review

Throughout the Ellsworth Industrial Park investigation process, U.S. EPA and IEPA have evaluated available documents and records from numerous properties and businesses within the site to identify current and previous users of chlorinated-solvent products. In October 2001, IEPA sent out information-request letters to approximately 21 facilities that had been identified during their initial door-to-door survey of the Ellsworth Industrial Park as using chlorinated cleaners/solvents or other types of chlorinated materials. The information IEPA requested pertained to the site activities related to the purchasing, receiving, processing, storing, treating, disposing, or otherwise handling of hazardous substances. U.S. EPA reviewed this information along with available records from the U.S. EPA Records Center in order to develop a list of facilities in the industrial park identified as using chlorinated solvents.

U.S. EPA has continued this process into the Phase I RI/FS stage to re-examine existing information and expand the review to identified properties outside the Ellsworth Industrial Park. The following discussion provides a brief summary of the results of these background investigation activities undertaken by U.S. EPA prior to the Phase I RI/FS investigation.

Dyna Gear, Inc.

Dyna Gear, Inc., is located at 2500 Curtiss Street and is an aftermarket and original manufacturer of automotive equipment including gears. The property is owned by NBD Trust Company. The information IEPA obtained from an Information Request Letter sent on 3 October 2001 indicates the building was constructed in 1987 and Dyna Gear has occupied it since that time. The facility consists of a one story warehouse and manufacturing building. All chemicals are purchased from

Perkins Products and ZEP Products, and all waste is disposed of by Beaver Oil Company. No solid waste has been removed from the company in the last 5 years and the company indicated that it has purchased no chlorinated solvent/cleaner chemicals. Previous investigations at the facility include a Phase I Environmental Site Assessment (ESA) performed in June 1998 and the facility was found to be in good environmental condition. A title search was conducted for the ESA and there was no indication the property had been used for storage or disposal of hazardous waste.

U.S. EPA Phase I SA activities included soil boring sampling at six locations around the perimeter of this property in February 2002. A total of five groundwater samples were collected from various depths. Volatile organic compounds (VOCs) detected include acetone, 2-butanone, chloroform, benzene, 1,1,1-trichloroethane (1,1,1-TCA), 1,2-dichloroethane (1,2-DCA), trichloroethene (TCE), toluene, and tetrachloroethene (PCE).

MXL Industries, Inc.

MXL Industries, Inc. is located at 2300 Wisconsin Street and is a plastic injection molding and tool & die manufacturer. The company owns the property and has been operating at the location since 1998. According to the 2001 IEPA survey, MXL indicates they did not use chlorinated chemicals at the time of the survey. Lubricating oils and naphtha were used and were handled by Safety Kleen, Inc.

The former occupant of this property was JL Clark Atlas Tube, a manufacturer of toothpaste tubes, who operated at the site from 1967 to 1997. The property was sold to MXL in 1998. The response to the U.S. EPA CERCLA 104(e) request indicated Atlas Tube used 1,1,1-TCA (between 10 and 30%), PCE in carpet shampoo (1%), and an unspecified chlorinated solvent (33.5%) in its machine shop. According to the response, there were no known leaks, spills, or releases of hazardous materials at the facility.

Flexible Steel Lacing Company (Flexco)

Flexible Steel Lacing Company, located at 2525 Wisconsin Avenue, is a manufacturer of flexible steel lacings, conveyor belt fasteners, and belt products. Flexco has been at this location for over 30 years. The information IEPA obtained indicated that the facility used TCE until approximately 1990 in order to generate oil and water coolant. The firm also used naphtha parts cleaner. Waste products include waste naphtha and 9644 Solvent 150, which may contain TCE and PCE.

According to the response to the IEPA Information Request letter, Flexco began operations at the facility in 1967. In 1981, Flexco purchased additional land adjacent to the facility at 2655 Wisconsin Avenue from Lovejoy, Inc. Flexco indicated that they do not store or handle hazardous waste substances at the facility other than small amounts of paint and janitorial supplies. Spent petroleum and hydraulic fluids are stored in 55-gallon drums, which are collected by Beaver Oil for reprocessing.

From approximately 1968 to 1992, Flexco operated a vapor degreaser to remove excess oil from parts. This operation used approximately 5 drums of TCE per month. Virgin solvent was delivered to the facility by Baron Blakeslee, which provided a storage tank for the solvent, and also retrieved spent solvent. Solvents were stored in drums next to the vapor degreaser until 1971 when a 250-gallon storage tank was installed. Spent TCE was stored in drums in the heat treat work area. A cold trap solvent saver was installed in 1982 which reduced solvent use to approximately 4 drums per quarter. The vapor degreaser was removed in 1992 along with the 250-gallon storage tank and the former degreaser location was cleaned and filled with concrete. Remaining solvents were disposed off-site.

The response to the U.S. EPA CERCLA 104(e) Information Request letter indicated floor drains are connected to the storm sewer system; however, over time, Flexco has gradually sealed many of the floor drains at the facility.

Lovejoy Industries

Lovejoy Industries is currently located at 2655 Wisconsin Avenue, and is a manufacturer of couplings for transmissions, industry, and machine parts. Responses to the U.S. EPA 104(e) indicated that Lovejoy Industries has operated at two additional address within the Ellsworth Industrial Park at various time periods. Lovejoy has operated at its 2655 Wisconsin Avenue facility continuously since 1971. Lovejoy has also operated at 2431 Curtiss Street (see Contemporary Control Systems summary below) and at an additional facility (Lovejoy Electronics) at 5411 Walnut.

The following information is believed to be related to the 2655 Wisconsin Avenue location. According to responses to U.S. EPA information requests, Lovejoy indicated they did not use chlorinated chemicals. However, an air permit for a sintering furnace has been issued and generates coolant and waste. Solid wastes were not stored outside the building, and no waste piles, landfills, surface impoundments, lagoons, or pits are located on-site. Unspecified hazardous materials were used in four "black oxide" tanks located at the 2655 Wisconsin Avenue facility. Hazardous waste from the "black oxide" line was collected in drums located near an evaporator along the east wall of the building. There are no underground storage tanks (USTs) on the property. One 600-gallon waste oil AST is present on the east side of the building. Small amounts of methylene chloride were used for a short time period. Small amounts were placed on a towel used to clean parts and it was stated that the solvent was consumed in the process. Manifest documentation from 1988 to 2001 do not indicate TCE or PCE waste generation. However, black oxide waste stream samples collected in 1992 showed the presence of PCE in one sample at 0.021 mg/L during a facility investigation. No recognized environmental conditions were noted during a 1997 Phase I ESA.

No information is available regarding Lovejoy ownership or operations at its 5411 Walnut Street facility.

Burlington Northern Railway Easement

IEPA and U.S. EPA information requests were sent to the Burlington Northern and Sante Fe Railway Company in 2001 and 2002. Responses indicated that the company did not have any information related to a 1973 train derailment accident. A newspaper article dated 7 March 1973 in the Downers Grove Reporter describes an 18 car derailment took place at Belmont Road just south of Warren Avenue on 4 March 1973. Damage cost estimates were included for damage to tracks, buildings, and rail platform. No other information was available.

Burnside Construction

Burnside Construction, located at 2400 Wisconsin Avenue, has owned and occupied the property for nine years and is in the home building business. According to the 2001 IEPA survey, the company indicates it has never used chlorinated chemicals; however, they do generate some naphtha and waste oil which is processed by Safety Kleen.

According to the U.S. EPA 104(e) response, the property was previously occupied by Suburban Moving and Storage Company (Suburban Self Storage). Suburban owned or leased this property from 1971 through 1994. Information indicates a groundwater monitoring well was installed at the facility in 1994; however, no further information is available.

CVP Systems, Inc.

CVP Systems, Inc., located at 2518 Wisconsin Avenue, has been present at the property for 13 years and assembles vacuum packaging equipment for the food industry. According to the 2001 IEPA survey, CVP stated they did not use chlorinated chemicals; however, a small parts cleaner was in use over seven years ago. The response to the U.S. EPA 104(e) indicates CVP has leased the property since 1984. From 1991 through 1998, Safety Kleen provided a tank for disposal of lubricant used for metal working machines and a parts washer. CVP states they have never used, purchased, or stored hazardous materials within the Ellsworth Industrial Park going back to 1950. No spills or facility investigations have been performed at the property.

Contemporary Control Systems, Inc.

Contemporary Control Systems, Inc. (CCSI), located at 2431 Curtiss Street, is a manufacturer of computer PC boards, and has leased the property from the Arrow Gear Company for the past 2 ½ years. According to the 2001 IEPA survey, the company indicated they have never used chlorinated chemicals at the facility. The company has operated at other locations in the area, including 2733 Curtiss Street from 1985 to 1987, and 2512 Wisconsin Avenue from 1988 to 1997. The company has apparently used degreasers in the past, but discontinued their use in 1987. According to the response to the U.S. EPA 104(e), CCSI has never used TCE or PCE containing solvents. The only hazardous materials used are lead in a solder material. Hazardous materials are removed from the facility by Alpha Fry Metals.

Lovejoy Industries has been identified as a prior occupant of the 2431 Curtiss Street location, and used the facility as a machine shop. See also the descriptions provided above for Lovejoy Industries. No further information is available.

Spannagel Tool & Die

Spannagel Tool & Die, located at 2732 Wisconsin, manufactures tools and dies and has owned the property for 34 years. The company has indicated that it does not use chlorinated chemicals at the facility. No further information is available for this property.

Molex Incorporated

Molex, Inc. (Molex) is a manufacturer of electric and electronic connectors, which involve metal-plating and injection-molding operations. The company has two locations within the industrial park, one at 5225 Walnut Avenue (Molex Fiber Optics) and the second at 5224 Katrine Avenue.

Molex has occupied the 5225 Walnut Avenue facility for over 12 years. The first 10 years, the facility was used as a warehouse, and is currently used for manufacture of fiber optic cable assemblies and molding operations. The IEPA survey indicated that a 2,500-gallon UST containing mineral spirits was removed in 1999. The soil surrounding the tank was found to be contaminated and was remediated and tested for cleanup verification; however, analysis for PCE/TCE was not conducted as part of this remediation. Plating operations were also conducted at this property prior to 1993 which generated a nickel sludge. Mineral spirits were also used in a stamping operation. Three shallow monitoring wells are present on the Walnut Avenue property, but no specific well information (depth, boring logs, sample data, etc.) was available. These wells were sampled during the U.S. EPA Phase II SA.

Little information is available for the Katrine Avenue property other than Molex purchased the property from a bank trust in 1964 and have indicated that chlorinated chemicals are not used at the property.

A third Molex facility is located at 2800 Hitchcock Avenue which had only been leased for eight months at the time of the 2001 IEPA survey. No further information is available for this facility.

Bison Gear and Engineering Corporation

Bison Gear and Engineering Corporation, previously occupied the property at 2424 Wisconsin Avenue, and was a manufacturer of gears, shafts, and aluminum castings used for gear and electric motors. A company called Flowserve is the current occupant and has been present for approximately 4 years. The response to the U.S. EPA 104(e) indicates Bison leased the property from 1976 to 1997. The company used 1,1,1-TCA (in waste petroleum naphtha) to clean gears and for a cutting process in a closed loop system. In 1986, approximately 2,200 gallons of waste petroleum naphtha was generated. Solvents were stored in drums. Cutting oil was drained from machinery once or twice a year and removed by Beaver Oil. Waste naphtha was disposed of by Safety Kleen. The company indicated they stopped using solvents in the late 1980s or early 1990s. A parts washing machine was purchased in 1986 to reduce the amount of waste petroleum naphtha generated. An IEPA inspection in 1991 noted petroleum stained soil at the property adjacent to a drum storage area. Contaminated soil was removed in May 1991 under IEPA oversight. A June 1991 site inspection by the DuPage County Department of Environmental Concerns found the property to be in compliance with applicable environmental regulations.

Alleged Dumping Area

The alleged dumping area is located between 2537 Curtiss Street (Ames, Inc.) and 2538 Wisconsin Avenue (Norwood Marketing). A report from a citizen to U.S. EPA personnel alleged that five gallon containers of chemicals were dumped in the woods approximately 13 to 15 years ago. No further information is available.

Chase-Belmont Properties

The Chase-Belmont properties consists of an office park type complex with addresses between 5000 to 5014 Chase Street. Multiple tenants have been located at the property dating back to 1973. No further information is available.

Former Wastewater Treatment Plant

The former wastewater treatment plant (WWTP) is located along St. Joseph Creek south of the intersection of Glenview and Curtiss Streets. This property is believed to be owned by the Downers Grove Park District. No other information is available.

Maple Plaza Cleaners

Maple Plaza Cleaners, located at 2265 Maple Avenue, is a dry cleaning service which has been present at the location for 3 ½ years. According to the responses to the 2001 IEPA Information Request, the business is a conditionally exempt, small quantity generator. The facility uses less than 140 gallons of PCE a year for its dry cleaning operations. No permits or spills were identified for the facility; however, drilling and testing was conducted in 1998 inside and outside the facility. No evidence of contamination was found. In June 2002, the facility was found to be in compliance with state and federal regulations and requirements of the Dry Cleaners Environmental Trust Fund of Illinois. No further information is available.

C&C Machine Tool Services

C&C Machine Tool Services, Inc, (C&C), located at 5024 Chase Street, is a repair company for electrical components of printing presses, and has been at the property for five years. Former occupants are unknown. The 2001 IEPA survey indicated the company used 1,1,1-TCA and PCE, and generated various listed hazardous waste (D001, D0035, D0039, F003, F005, and F007). C&C has leased the property from Chase-Belmont Properties since 1996. Paints and solvents are routinely used in this business. Used paint, filters, and solvents are stored in containers supplied by Safety Kleen, which collects them for disposal. No USTs or ASTs are located on the property. Wastewater and stormwater are disposed through the Downers Grove wastewater system. A paint spray booth was also located at the property. The company has indicated they have not used chlorinated chemicals during their occupation of the property; however, the company received several LDR notifications from Safety Kleen for parts cleaner wastes picked up from the facility which contained PCE. PCE-containing (0-1%) laquer thinners were also used.

Hahn Graphics

Hahn Graphics, formerly located at 5023 Chase Avenue, conducts off-set printing services and has leased the property since 1987. The property is owned by Chase-Belmont Properties according to the IEPA information request. The business owner has indicated that there are no waste pits or ponds at the property and all materials used are purchased in gallon increments. One solvent product was identified as being used consisting of Safety Kleen 105 Solvent which contains PCE at 0 to 0.2990 by weight. The information response indicates some unspecified cleaning agents were picked up for recycling by Safety Kleen. The former occupant of the property was a computer company.

Auto Nation

Auto Nation, also known as the Joe Madden Ford Auto Body Shop, is located at 5126 Walnut, owns the property and has been at this location for 13 years. The company indicated in their response to the U.S. EPA 104(e) information request that the property was vacant prior to purchase by Joe Madden Ford. The company operates an auto body repair shop. In 1999, Joe Madden Ford entered into an asset purchase agreement with Auto Nation, Inc. and AN/MF Acquisition Corp. to purchase the assets of Joe Madden Ford. The Madden Partnership owns the property and Auto Nation leases the facility. The facility contains two paint spray booths and a mixing room. Spent solvents, antifreeze, oils, and waste paints are containerized and recycled by outside vendors. A parts washer is also located onsite which is serviced by Safety Kleen. The company indicated there are no waste piles, landfills, impoundments, lagoons, USTs, or ASTs at the site. Santary and wastewater is routed through catch basins or oil-water separators prior to discharge to the Village of Downers Grove wastewater system. According to the IEPA response, the only chlorinated chemicals used are paint thinner for paint spray gun cleaning. Approximately eight gallons of this material is used on a monthly basis. A Phase I ESA was performed at the facility in October 1999 which noted evidence of spills (oil and laquer paint) around storage drums inside and outside the body shop. Used batteries and tires were also noted as being discarded on the property. It is was noted in the response that spills and debris have since been removed. A Phase II ESA was also performed which revealed no contamination in testing areas. The scope of Phase II activities is not known.

Ketone Automotive

Ketone Automotive is located at 4935 Belmont Road. The company has been at the location and leased the property for more than 17 years. Ketone Automotive is a retailer of paint and paint related products. There are no manufacturing operations conducted on the property; however, mixing operations occur. According to the response to the 2001 IEPA survey, the company indicated chlorinated chemicals are not used at the property; however, some paint products contained chlorinated components and generate waste. Former occupants are undocumented, however, information suggests a former auto body shop occupied the property. No further information is available.

Bales Mold Service

Bales Mold Service, Inc., located at 2824 Hitchcock Avenue, is a plastic injection mold refinisher, and includes chrome and nickel plating operations. They are the owner of the property and have been present for 16 years. Former occupants are not known. According to information provided to IEPA, a TCE vapor degreaser was located at the property at the time of the survey (purchased in February 2000). The company also indicated that it generates waste hydrochloric acid (HCl), nitric acid (HNO3), and potassium hydroxide (KOH) from refinishing operations. Several state and local permits are on file for the facility including Industrial Wastewater Discharge, Lifetime Operating Permit Injection Mold Servicing, and construction permits for plating operations. Previous facility investigations between 1997 and 2001 indicated the presence of chromium, nickel, lead, zinc, and copper in soil samples. No further details of these investigations were available.

MB Cleaners

MB Cleaners is located at 2754 Maple Avenue. No additional information is available for this property.

Maple Grove Automotive

Maple Grove Automotive, Ltd. is located at 2315 Maple Avenue. No additional information is available for this property.

K&C Services

K&C Services (K&C), located at 5240 Belmont Road, is a machine tool repair company. The company leases the property and has been at the location for 10 years. The property is owned by Arrow Gear, which was also a former occupant of the property. According to the response to the 2001 IEPA survey, the company does not use chlorinated chemicals. A commercial product (Simple Green) is used for any required degreasing. No further information was available.

Litton Systems

Litton Systems, Inc. (also known as Liberty Copper & Wire and Magnetek) formerly occupied the property at 2333 Wisconsin Avenue. The property is currently occupied by Suburban Self Storage, a self-storage facility, which has occupied the property since approximately 1988. Information provided in the U.S. EPA 104(e) information request sent to Litton Systems indicated that Liberty Copper & Wire was incorporated in 1956, acquired by Jefferson Electric Company in 1970, and merged into Litton Systems in 1972. The company was then sold to Magnetek, Inc. in 1984. The company's response also stated that Litton Systems no longer possessed information regarding the use of chlorinated chemicals and indicates that all records regarding the operations of Liberty Copper & Wire were transferred to Magnetek at the time of the sale.

The response to the U.S. EPA 104(e) information request sent to Suburban Self Storage contained environmental information about previous operations by Magnetek and Liberty Copper & Wire. Review of information from the U.S. EPA CERCLA Records Center indicated that the facility used toluene, xylene, cresylic acid, and methanol. Additional information from a 1993 U.S. EPA site inspection documented waste generation at the facility including waste enamel, solvent, electroplating sludge, phenol, and urethane. Corresponding waste codes associated with waste generation identified above include F003, F004, F005, F006, D001, U188, and U238. In 1985, Liberty Copper & Wire generated approximately 9,000 pounds of waste enamel and solvent which was shipped off-site. The site was previously regulated under RCRA. During RCRA closure activities soils, were found to be contaminated with xylene (57,100 ppm). A Phase I ESA was conducted for the property in 1997 in which additional testing was recommended for xylene and

PCE contamination; however, no further information was available. Review of historical information provided by Environmental Data Resources, Inc. (EDR) indicated that three 4,000-gallon USTs and one 5,000-gallon UST containing hazardous substances have been closed.

METRA Site No. 1

The METRA site No. 1 is located on the northeast corner of Belmont Road and Warren Avenue (just south of 4935 Belmont Road). The property currently consists of an asphalt and gravel parking facility for the METRA station. No further information is available for this property.

METRA Site No. 2

The METRA site No. 2 is located on the north side of Ketone Automotive (just north of 4935 Belmont Road). This property consists of a long, narrow gravel lot currently used for parking. No further information is available for this property.

SOURCE: U.S.G.S. 7.5 MINUTE TOPOGRAPHIC MAPS.
WHEATON, ILLINOIS QUADRANGLE.

FIGURE 1-1

RESPONSE ACTION CONTRACT U.S. EPA CONTRACT No. 68-W7-0026 WORK ASSIGNMENT No. 155-RICO-B51W DOCUMENT CONTROL No. RFW155-2A-AOHC	SITE LOCATION MAP ELLSWORTH INDUSTRIAL PARK SITE Downers Grove, Illinois

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TABLE 1-1

SITE SUMMARY LIST
ELLSWORTH INDUSTRIAL PARK SITE
DOWNERS GROVE, ILLINOIS

Property Identification		Address/Location
1	Dyna Gear	2500 Curtiss Street
2	MXL Industries, Inc.	2300 Wisconsin Avenue
3	Flex Steel	2525 Wisconsin Avenue
4	Lovejoy Industries/LJ Inc., Gear Division	5411 Walnut Avenue
5	Lovejoy Industries/LJ Inc., Gear Division	2655 Wisconsin Avenue
6	Burlington Northern Railway easement and right-of-way	Easement and right-of-way at intersection of Belmont and Warren Streets
7	Burnside Construction	2400 Wisconsin Avenue
8	CVP Systems, Inc.	2518 Wisconsin
9	Contemporary Control Systems, Inc. (Former Lovejoy)	2431 Curtiss Street
10	Spannagel Tool & Die	2732 Wisconsin Avenue
11	Molex	5224 Katrine Avenue
12	Molex	5225 Walnut Avenue
13	Bison Gear and Engineering Corporation (Flowserve)	2424 Wisconsin Avenue
14	Alleged dumping, woods area between Norwood and Ames	Property between 2538 Wisconsin and 2537 Curtiss
15	Chase-Belmont Properties	5000 to 5014 Chase Avenue
16	Former WWTP	South of intersection of Curtiss and Glenview Roads
17	Maple Plaza Cleaners	2265 Maple Avenue
18	C&C Machine Tool Services	5024 Chase Street
19	Hahn Graphics	5023 Chase Street
20	Auto Nation	5126 Walnut Street
21	Ketone Automotive	4935 Belmont Road
22	Bales Mold Service	2824 Hitchcock Avenue
23	MB Cleaners,	2754 Maple Avenue
24	Maple Grove Automotive, Ltd.	2315 Maple Avenue
25	K&C Services	5240 Belmont Road
26	Litton Site (Liberty Copper & Wire, Magnetek)	2333 Wisconsin Avenue
27	METRA Site 1	Belmont Road (vicinity 4935)
28	METRA Site 2	Belmont Road (vicinity 4935)

SECTION 2

SITE MANAGEMENT PLAN

The Site Management Plan for the Ellsworth Industrial Park site specifies how access, security, contingency procedures, management responsibilities, and waste disposal will be handled during the Phase I RI.

2.1 SITE ACCESS

The Phase I RI/FS investigation activities will consist of intrusive drilling and sampling tasks on each of the 28 identified private properties (Table 1-1). Drilling and sampling will be conducted in various locations at each property and is based on the amount and degree of historical information known about past practices and use of chlorinated solvents. For example, drilling and sampling will take place as close to possible outside a building where a vapor degreaser was/is located, if it can be determined. However, no drilling or sampling will be conducted within buildings or structures during this investigation phase. Drilling and sampling locations will be necessarily modified in the field based on the presence of underground or overhead utilities, structures, obstructions, or other access limitations. Phase I RI/FS drilling and sampling will take place with standard pickup truck mounted equipment; therefore, access to drilling and sampling locations is assumed adequate for this type of equipment. If additional land clearing or landscape damage is anticipated in order to access a sampling location, U.S. EPA will be notified, the issue will be discussed, and appropriate actions will be taken within the approved scope of work or authorized scope modifications.

Groundwater elevation measurements will be conducted in previously installed U.S. EPA monitoring wells, as well as monitoring wells installed on various private property by others. No special considerations are anticipated to access monitoring wells installed on Village of Downers Grove right-of-way (ROW); however, this activity will require access or permission be granted to WESTON employees and subcontractors by private property owners where wells are located.

U.S. EPA will secure access agreements with all property owners and provide documentation to WESTON prior to initiation of field activities where private property will require access to perform the scope of work.

2.2 SITE SECURITY

Phase I RI/FS drilling and sampling work will be performed over a wide area within and surrounding the Ellsworth Industrial Park site on both public and private property. Work will be conducted in areas where the general public and business employees may be present. Because of this, site security for equipment and personnel is an issue. To address these potential security issues, work will be conducted during normal business hours (weekdays 0700 to 1700). The Site Health and Safety Coordinator (SHSC) will be responsible for implementing safe work practices in accordance with the site Health and Safety Plan (HASP). This will include setting up safe work zones around drilling and sampling locations which will exclude non-essential persons during work activities. Equipment will be removed from work locations at the conclusion of each days activities. Each worker entity (e.g., WESTON, U.S. EPA, subcontractors, etc.) will be responsible for his/her own equipment and personnel.

Many of the private properties are active businesses and, therefore, WESTON personnel will need to coordinate investigation activities with facility personnel as well as customers who may require access to the property. This may result in unavoidable schedule delays which will not be the responsibility of WESTON.

The U.S. EPA will secure a central staging location where equipment may be stored at each entities own risk. At the time of this writing, it is anticipated that this staging area will be a centrally located property owned by the Village of Downers Grove; however, security and access characteristics of this location are unknown.

The centrally located staging area will be used to stage drums containing investigative derived waste (IDW) prior to characterization and disposal. Since it is not known whether this area will be secure (i.e., fenced, locked gates), drums lids will be securely fastened with no drums being left open overnight. Drums will also not be stacked to avoid the potential for injury of any trespassers who might access the staging area during non-work hours, or when personnel are not present. IDW drums will be clearly marked as owned by the U.S. EPA and the area used for storage of IDW will be taped off.

2.3 MANAGEMENT RESPONSIBILITIES/PROJECT ORGANIZATION

WESTON has selected a professional staff specifically for the implementation of this project. This section describes the duties and responsibilities of the individual members of the WESTON organization selected for this project. Table 2-1 shows the WESTON project team for this effort and their indicated responsibilities.

Program Manager

The Program Manager is responsible for establishing and executing project administration, project controls, project-related policy matters, and project levels of authority, responsibility and communication. Mr. James Burton will serve as the program manager, and will monitor the project's compliance with contract requirements.

Site Manager

The WESTON Site Manager will coordinate and communicate project activities with U.S. EPA, and WESTON representatives, and will negotiate any required scope changes as the project develops. WESTON's Site Manager, Mr. Kurt Fischer, will be generally responsible for keeping the U.S. EPA Region 5 Work Assignment Manager (WAM), or his designated representatives, informed of project progress. The Site Manager will be responsible for tracking the project budget and schedule, assembling and maintaining project staffing, keeping the client appraised of project progress, and transmitting reports to the client.

Project QA/QC Officer and Sample Management Coordinator

The Project QA/QC Officer and Sample Management Coordinator will assist the Site Manager and Field Task Managers as required to facilitate appropriate implementation of the QAPP and associated contract requirements. The Project QA/QC Officer and Sample Management Coordinator is Ms. Tonya Balla.

Health and Safety Team

Mr. Dan Leskovec is WESTON's Midwest Division Regional Safety Officer (RSO) and will perform the duties of overall health and safety compliance and implementation of WESTON's health and safety operating procedures for the project.

Mr. Ben Maradkel and Mr. Barry Crawford will perform the duties of on-site Site Health and Safety Coordinators (SHSC). The responsibilities will include on-site implementation of the approved HASP.

Data Management Team

The data management team will be responsible for management of incoming analytical and other field data. This will include data reduction, compilation, and placement of data into the appropriate database management tools (Equis). Ms. Natalie Kuester will serve as the main data management coordinator.

Risk Assessment Team

The risk assessment team will conduct review of site data and conduct evaluation of risk to human and ecological receptors at the site. Risk assessments are not included in Phase I RI/FS activities at this time. Team members will be identified at a later date.

Remedial Alternatives Evaluation Team

The remedial alternatives evaluation team will review applicable site data, assemble remedial alternatives from applicable technologies appropriate to the site conditions, and conduct screening throughout the Feasibility Study (FS) process. Remedial alternatives evaluation and FS tasks are not included in Phase I RI/FS activities at this time. Team members will be identified at a later date.

2.4 CONTINGENCY PLANS

WESTON does not anticipate the need for extensive contingency plans for the Ellsworth Industrial Park site Phase I RI/FS activities.

2.4.1 Sampling Point Access

Some of the proposed sample locations may not be accessible due to current storage and/or business activities at individual private properties. Should a sampling location be blocked and the obstruction not be moveable with a reasonable effort, the sampling should be taken at the closest possible point to the originally proposed location with the concurrence of the Site Manager.

If access is restricted completely, such as in the case of inaccessible wooded areas, the U.S. EPA WAM will be notified, and discussions will take place to determine whether to modify the scope of work to include clearing and grubbing (requiring additional subcontractors and costs) or implement alternate sampling strategies.

The circumstances for any changes in sampling locations will be documented accordingly in the field logbook.

2.4.2 Inclement Weather

The sampling schedule will be modified accordingly in the event of inclement weather. WESTON will not be responsible for scope of work modifications or schedule delays due to inclement weather conditions.

2.5 INVESTIGATION DERIVED WASTES

IDW will be drummed and disposed of by WESTON in accordance with applicable federal, state, and local laws and regulations. It is anticipated that drums of IDW will be temporarily stored on-site within a specified area of the site designated and secured by U.S. EPA. It is estimated that up to 60 drums (55-gallon) may be generated and require disposal at an approved disposal facility. WESTON has proposed geoprobe drilling and sampling methods to minimize soil cuttings and waste removal costs.

The following assumptions have been used in addition to the general assumptions described above.

Soil, Groundwater, and Decontamination Rinsate

- Excess soil cores/cuttings, purge water, and decontamination rinsate generated during field activities will be containerized in 55-gallon drums and moved to the U.S. EPA designated storage area.

- Soil and grab groundwater sampling activities will generate minimal waste (IDW) that needs to be containerized and stored. A maximum of two drums per property (60 drums) is assumed sufficient for containerizing borehole cutting or excess soil cores, decontamination rinsate, purge water, expended personal protective equipment (PPE) and sampling supplies.

- Drums containing solids (excess soil cores/cuttings) will be sampled by WESTON and analyzed for VOCs, SVOCs, PCBs, metals, TCLP [VOCs, SVOCs, pesticides, herbicides, metals], reactivity (reactive cyanide and sulfide), corrosivity (pH), and ignitability. Drum samples will composited at a frequency of one sample per 5 drums; therefore, assuming 30 total drums containing soil, 6 samples will be collected for the above analysis. Analysis will be conducted by the U.S. EPA Region V Central Regional Laboratory (CRL).

- Drums containing liquids (purge water, decontamination rinsate, etc.) will be sampled by WESTON and analyzed for VOCs, SVOCs, PCBs, metals, corrosivity (pH), and ignitability. Drum samples will composited at a frequency of one sample per 5 drums; therefore, assuming 30 total drums containing liquids, 6 samples will be collected for the above analysis. Analysis will be conducted by the U.S. EPA Region V CRL.

- It is assumed that the drums containing soil and liquids will require off-site disposal as non-hazardous materials. Handling and disposal of hazardous wastes are not included in this scope of work.

Personal Protective Equipment

Equipment in contact with sample material will be segregated into trash bags and contracted for non-hazardous disposal. Items included for disposal by this method are nitrile surgical gloves, rinsed methanol containers, Teflon-lined tubing, sample containers broken or discarded after contact with sample media, and other items that come in contact with sample media.

Common Refuse

Other material will be disposed as general refuse in an on-site or off-site dumpster or other trash receptacle. Items included for this disposal method include cardboard, plastic, paper, ice bags, and other material that does not come in contact with sample media.

Drum Labeling

Drums used to store waste material produced during this field program will be labeled with information to include date, material, drum and contents owner (U.S. EPA), and other pertinent information. The side and top of each drum will be labeled with a permanent marking stick.

All IDW and any other waste generated during the Phase I RI/FS will be properly disposed of at the completion of all field activities. No equipment or materials will be left on-site after completion of field activities.

TABLE 2-1

**WESTON PROJECT TEAM
ELLSWORTH INDUSTRIAL PARK SITE
DOWNERS GROVE, ILLINOIS**

Title	Individual	Responsibilities/Duties
Program Manager	James Burton	Program management, contract compliance, and overall project quality assurance
Site Manager	Kurt Fischer	Project management, subcontractor management, technical work scope implementation, daily communication, monitoring of schedule and budget
Project QA/QC Officer	Tonya Balla	Implementation of the QAPP and associated contract requirements
Health and Safety Team	Dan Leskovec, Barry Crawford, Ben Maradkel	Implementation of WESTONs divisional haelth and safety program and implementation of the approved HASP for on-site activities.
Data Management Team	Natalie Kuester, Ben Maradkel	Data reduction, compliation, and tabular presentation. Database management. Field sample management coordination.
Risk Assessment Team	TBD	Review and evaluate field data. Provide toxicology support, human health and ecological risk assessment, and data evaluation capabilities
Remedial Alternatives Evaluation Team	TBD	Review and evaluate field data. Provide screening of remedial alternatives and feasibility study support

TBD - To be determined

A.1 TITLE OF PLAN AND APPROVAL

SECTION 3
QUALITY ASSURANCE PROJECT PLAN
PHASE I REMEDIAL INVESTIGATION/FEASIBILITY STUDY
ELLSWORTH INDUSTRIAL PARK
DOWNERS GROVE, ILLINOIS

Prepared by

Weston Solutions, Inc
750 E. Bunker Court
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Vernon Hills, Illinois 60061

Prepared by ______________________ Date 11/7/03
for Tonya Balla, Senior Project Engineer

Reviewed by ______________________ Date 11/7/03
Kurt T. Fischer, Project Manager

Reviewed by James M. Burton Date 11/7/03
James M. Burton, P.E., Program Manager

Approved by ______________________ Date __________
Mazin Enwiya, U.S. EPA Remedial Project Manager

Approved by ______________________ Date __________
Warren Layne, U.S. EPA Region V Quality Assurance Reviewer

A.2 INTRODUCTION

The United States Environmental Protection Agency (U.S. EPA) requires that all environmental monitoring and measurement efforts mandated or supported by U.S. EPA participate in a centrally managed quality assurance and quality control (QA/QC) program. Any party generating data under this program has the responsibility to implement minimum procedures to assure that the precision, accuracy, completeness, and representativeness of its data are known and documented. To ensure the responsibility is met uniformly, each party must prepare a written Quality Assurance Project Plan (QAPP) covering each project it is to perform.

This QAPP has been prepared in accordance with "U.S. EPA - Region 5, Instructions on the Preparation of a Superfund Division QAPP, based on U.S. EPA QA/R-5, Revision 0, June 2000 and the EPA Requirements for QAPPs for Environmental Data Operations, (EPA QA/R-5), March 2001. As described in the instructions, this QAPP is organized into four Sections as described below:

- SECTION A: The elements in this section cover aspects of project management, objectives, and history. This section identifies the roles and responsibilities of project personnel and describes the communication procedures. This section identifies the goal of the proposed removal assessment plan at the site.
- SECTION B: The elements in this section describe the design and implementation of measurement systems that will be used during the removal assessment action at the site. This section describes sampling procedures, analytical methods/procedures, and data handling and documentation procedures. Standard Operating Procedures (SOPs) for sampling and testing are referenced and included as attachments to this QAPP. Quality control procedures, frequency requirements, acceptance criteria, and corrective action procedures associated with all methods are also provided in this section.
- SECTION C: The elements in this section describe the procedures used to ensure proper implementation of Section B.

- SECTION D: The elements in this section describe the quality assurance (QA) activities that are expected to occur after the data collection phase of the removal assessment is completed.

A.3 DISTRIBUTION LIST

The distribution list is provided in Table A-1.

A.4 PROJECT ORGANIZATION AND RESPONSIBILITIES

Key personnel responsibilities are discussed in the following subsections. Figure A-1 presents the project organization chart.

A.4.1 Project Management

This project is a federal-lead project which is being coordinated by a U.S. EPA Remedial Project Manager (RPM) who has overall responsibility for all phases of this removal assessment.

Operational responsibilities involving execution and direct management of the technical and administrative aspects of this project have been assigned as follows:

A.4.1.1 Project Management Responsibilities

U.S. EPA Remedial Project Manager—Mr. Mazin Enwiya is the U.S. EPA RPM for this project. Mr. Enwiya has overall responsibility for all phases of the Ellsworth Industrial Park RI/FS project.

WESTON Program Manager—Mr. James Burton is the WESTON Program Manager. The Program Manager has overall responsibility for the work assignment. The Program Manager is responsible for ensuring that the project meets all U.S. EPA objectives and quality standards. He is also responsible for ensuring that all work is executed in accordance with the U.S. EPA's technical directives. The WESTON Program Manager is responsible for assigning and monitoring the functions and responsibilities of the WESTON Project Manager. In addition, he will commit the necessary resources and personnel to meet the objectives of this removal assessment.

WESTON Site Manager—Mr. Kurt T. Fischer is the Site Manager. The Site Manager is responsible for implementing the project objectives utilizing the personnel assigned. The Site Manager's primary function is to ensure that the technical, financial, and scheduling objectives are achieved successfully. The WESTON Site Manager will coordinate with the WESTON Program Manager, and Quality Assurance Manager and will be the major point of contact and control for matters concerning the project. His other responsibilities include:

- Coordination and management of project personnel
- Project scheduling
- Coordination and review of required deliverables
- General QA of field activities
- Represent the project team at meetings and public hearings

A.4.1.2 Quality Assurance Responsibilities

U.S. EPA Field Services Section (FSS) Quality Assurance Reviewer—The U.S. EPA Region V Superfund FSS will be responsible to review and approve all QAPPs. The U.S. EPA FSS also has the discretion to conduct external performance and system audits of field and laboratory activities.

WESTON Quality Assurance Officer (QAO)—Mr. Jon Olander is the WESTON RAC QAO. The WESTON QAO has the responsibility to implement and administer the WESTON Quality

Assurance Program. He is responsible for coordinating all procedures and tasks pertaining to QA and reporting to the WESTON Program Manager on QA issues. Other duties include:

- Exercise overall responsibility for all audits under the RAC contract
- Determine projects and activities to be audited
- Establish audit schedules
- Notify the audited entity of nonconformances and the need for corrective actions
- Approve the disposition of nonconformances
- Update and/or develop new SOPs in response to an observed need

WESTON Sample Management Coordinator and Data Validator– Ms. Tonya Balla is the WESTON Sample Management Coordinator. WESTON's Sample Management Coordinator will coordinate all Ellsworth Industrial Park site sampling requirements and schedules with the U.S. EPA Region V Sample Control Coordinator (RSCC). Ms. Balla will be responsible for coordinating or performing analytical data review and data validation for any data.

A.4.1.3 Field Responsibilities

WESTON START Project Leader/Field Team Leader– WESTON will designate a Field Team Leader that will be responsible for the daily direction of the team members regarding the work plan-specific tasks. The Field Team Leader will provide the initial technical review of all deliverables and data collection activities. In essence, this person will be responsible for the management of the field team and the supervision of all field activities in the absence of the WESTON Project Manager.

WESTON Site Health and Safety Coordinator– WESTON will designate a person to be responsible for implementing the Health and Safety Plan. The SHSC will perform health and safety monitoring and ensure compliance with all health and safety requirements.

A.4.1.4 Laboratory Responsibilities

All laboratory analysis will be conducted through the U.S. EPA Contract Laboratory Program. All soil and water samples will be analyzed for volatile organic compounds (VOCs).

A.5 PROBLEM DEFINITION/BACKGROUND INFORMATION

As required by EPA QA/R-5, a summary of site background and history is contained in the QAPP. The following information is identical to that found in Section 1.

A.5.1 Site Background/History

The Ellsworth Industrial Park Site is located in Downers Grove, DuPage County, Illinois. The site encompasses the area in which chlorinated solvent groundwater contamination has been detected in the groundwater. The approximate boundaries of the site are Burlington Avenue to the north, 63rd Street to the south, Lee and Springside Avenues to the east, and Interstate 355 (I-355) to the west. The site consists of residential, recreational, and commercial/light industry properties. The source of contamination is suspected to originate within the Ellsworth Industrial Park, which is located in the northern portion of the Site, and is bordered by Burlington Avenue (north), Elmore and Inverness Avenues (south), Belmont Avenue (east), and I-355 (west). Site drainage appears to be towards the St. Joseph Creek which traverses the industrial park from east to west.

Between spring and fall 2001, the Illinois Environmental Protection Agency (IEPA) performed a groundwater investigation on the east side of I-355 near Downers Grove in response to citizen concerns related to recent private-well sampling in neighboring Lisle. The investigation consisted of three rounds of residential-well sampling throughout the area. Approximately 495 private wells were sampled and analyzed for levels of volatile organic compounds (VOCs). Sample results indicated elevated levels of tetrachoroethylene (PCE), trichloroethylene (TCE), and other related VOCs. Approximately 52% of the samples collected contained PCE or TCE above 5 parts per billion (ppb) (the federal drinking-water standards and the State of Illinois Maximum Contamination Limit [MCL]).

In response to these findings, the IEPA performed a cone penetration test (CPT) investigation within the Ellsworth Industrial Park (Parsons, 2001). The investigation used a CPT rig to log the shallow lithology in the area and collect groundwater samples at a variety of depths above the bedrock in order to evaluate the source area(s) of the chlorinated solvent releases. The area of investigation included only the southern and southeastern-most portions of the industrial park along portions of Wisconsin, Elmore, and Inverness Avenues. During the investigation, 28 groundwater samples were collected from 27 separate sampling locations within the industrial park. Of the 28 groundwater samples, one sample was found to contain TCE.

In February 2002, the United States Environmental Protection Agency (U.S. EPA) and IEPA conducted Phase I Site Assessment (SA) activities at selected locations within the industrial park. The IEPA conducted boring and sampling activities using a Geoprobe unit outfitted with membrane interface probe (MIP) technology for soil logging and sample collection. This was followed by an additional CPT investigation throughout the industrial park and selected areas east of the park. The CPT rig was used to advance stratigraphy borings, which defined the geology at each location as well as identified the presence of water-bearing zones within the unconsolidated overburden. Each boring was advanced to refusal, which ranged from approximately 12 to 80 feet bgs. A total of 44 locations were advanced using the CPT and Geoprobe MIP technology. A total of 37 investigative groundwater samples were collected. Chlorinated solvents, including 1,1,1-TCA, PCE, TCE, and their common degradation products, were detected at several locations and at various concentrations within the industrial park. The highest concentrations were generally found to be present along Curtiss Street between Chase Street and Katrine Avenue. TCE was detected in shallow groundwater in this area at concentrations up to 218 microgram per liter (ug/L). The presence of TCE and PCE in shallow groundwater provided a potential link between source(s) in the industrial park and contamination observed in residential wells downgradient of the site.

Based on the results of the Phase I SA, a Phase II investigation was undertaken as a joint effort between U.S. EPA and IEPA to further characterize chlorinated solvent contamination in soil and groundwater and identify potential sources. Prior to field investigations activities, significant efforts were undertaken to gather and evaluate existing data and information on properties and businesses within the industrial park. This information was used to focus field investigative efforts on likely chlorinated solvent source facilities based on past and present use of these chemicals. In addition to focused investigation at specific facilities, a network of groundwater monitoring wells was also installed throughout the industrial park to begin evaluating site hydrogeologic characteristics.

The results of the Phase II SA indicated that PCE and TCE were detected at numerous and widespread locations and depths within the Ellsworth Industrial Park in soil at concentrations up to 500,000 ug/Kg, indicating the presence of probable source facilities nearby. PCE and TCE were also detected in groundwater in both glacial drift and bedrock aquifers at concentrations up to 190 ug/L. By comparison, the highest PCE/TCE concentrations observed in residential wells south of the site were typically around 15 ug/L. These data indicate that PCE/TCE appears to be migrating from source facilities within the industrial park through overburden soil, entering the bedrock aquifer system, and migrating in a downgradient direction towards the affected residences.

A.6 PROJECT/TASK DESCRIPTION AND SCHEDULE

A.6.1 FIELD INVESTIGATION

The U.S. EPA anticipates that the RI/FS will require two phases of data acquisition. The Phase I RI/FS will only include specific data acquisition activities for the 28 properties listed below:

Properties within Ellsworth Industrial Park include the following:

- DynaGear (2500 Curtiss Street)
- MXL Industries, Inc. (2300 Wisconsin Avenue)
- FlexSteel (2525 Wisconsin Avenue)
- LoveJoy (1) Industries/LJ Inc., Gear Division (2431 Curtiss Street). This address also identified as Contemporary Control Systems, Inc. (2431 Curtiss Street).
- LoveJoy (2) Industries/LJ Inc., Gear Division (5411 Walnut Avenue)
- LoveJoy (3) Industries/LJ Inc., Gear Division (2655 Wisconsin Avenue)
- Burlington Northern Railway (easement and right-of-way [ROW])
- Burnside Construction (2400 Wisconsin Avenue)
- CVP Systems, Inc. (2518 Wisconsin Avenue)
- Spannagel Tool & Die (2731 Wisconsin Avenue)
- Molex Fiber Optics Division (5224 Katrine Avenue)
- Molex, Inc. (5225 Walnut Avenue)
- Bison Gear (2424 Wisconsin Avenue)
- Wooded Ara (possible disposal area) between Norwood (2538 Wisconsin) and Ames (2537 Curtiss)
- Chase-Belmont Properties (5000 to 5014 Chase Avenue)
- LITTON Liberty Copper & Wire, Magnetek (2333 Wisconsin Avenue)
- C&C Machine Tool Services (5024 Chase Street)
- Hahn Graphics (5032 Chase Street)

- Auto Nation (formerly Joe Madden Ford) (5126 Walnut Street)
- Bales Mold Service (2824 Hitchcock Avenue)
- K&C Services (5240 Belmont Road)

Properties outside Ellsworth Industrial Park include the following:

- Former Downers Grove Wastewater Treatment Plant (south of Curtiss and Glenview Streets)
- Maple Plaza Cleaners (2265 Maple Avenue)
- Ketone Automotive (4935 Belmont Road)
- MB Cleaners (2754 Maple Avenue)
- Maple Grove Automotive, Ltd. (2315 Maple Avenue
- Metra Site No. 1 (vicinity 4935 Belmont Road)
- Metra Site No. 2 (vicinity 4935 Belmont Road)

A Phase II RI/FS work plan and supporting documents will be prepared after the completion of Phase I activities. The project schedule is provided in Figure A-2.

A.6.1.1 Conduct Geological Investigations (Soils and Sediments)

The Phase I geological investigation of soil and sediment will consist of a shallow soil investigation using direct push Geoprobe equipment with direct sensing capability at each of the 28 properties.

Geoprobe equipment will be outfitted with a Membrane Interface Probe (MIP) and electrical conductivity (EC) sensors. The MIP is capable of monitoring and detecting the presence of total volatile organics as the probe is advanced through the subsurface. This will determine the presence and relative depth of any gross VOC contamination encountered. EC sensors measure the soil formation conductivity and can be used to describe general lithology at each location. MIP/EC boreholes will be advanced at each sampling location initially and will be advanced to a maximum depth of 30 feet bgs (or shallower, if refusal is encountered). Based on the results of MIP/EC logging, additional borings will be advanced adjacent to the MIP/EC borehole for the purpose of selecting soil cores (at the geologists discretion based on MIP/EC results) to verify lithology, perform field headspace screening, and collect soil samples for laboratory analysis. The soil samples collected during the investigation will be analyzed for VOCs only.

Sample collection procedures are discussed in the FSP.

A.6.1.2 Conduct Hydrogeological Investigations–Groundwater

WESTON will conduct a limited hydrogeological investigation to assess site hydrogeological conditions and to determine if site contaminants have impacted the shallow groundwater quality (less than 30 feet bgs).

To evaluate shallow groundwater quality at each of the 28 properties, an estimated one investigative grab groundwater sample will be collected from each Geoprobe testing location (total 152grab groundwater samples). To allow for additional discretionary groundwater sampling based on logging and field observations, it is assumed that one additional investigative groundwater sample will be collected at up to one-quarter the testing locations (38 groundwater samples). Sample collection procedures are further discussed in the FSP.

WESTON will conduct one groundwater elevation measurement round from each accessible existing monitoring well within the industrial park. These data will be used to construct groundwater potentiometric surface contour maps of the site. The measurement round will be conducted after completion of the two field events.

Existing permanent monitoring wells will not be sampled during this data acquisition phase.

A.7 QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

Data quality objectives (DQOs) are required for all environmental data collection activities. DQOs are statements of the quality of data needed to support a specific decision or an action. Data quality is defined in terms of the study objectives, rather than in terms of equipment or equipment analysis method characteristics. The DQOs must address the hypotheses that are to be proved or disproved and the necessary quality to support or defend the results obtained.

The DQO process is a series of planning steps based on the scientific method that is designed to ensure that the type, quality, and quantity of environmental data used in decision making are appropriate for the intended application.

DQOs are qualitative and quantitative statements derived from outputs of each step of the DQO process that:

- Clarify the study objective
- Define the most appropriate type of data to collect
- Determine the most appropriate conditions from which to collect the data

The DQOs are then used to develop a scientific and resource-effective sampling design.

The DQO process allows decision makers to define their data requirements and acceptable levels of decision during planning before any data are collected. DQOs are based on the seven step process described in EPA QA/G-4 (Sept. 1994) document. DQOs for this project are provided in Table A-2.

A.7.1 Precision, Accuracy and Sensitivity of Analysis

The fundamental QA objective with respect to accuracy, precision, and sensitivity of laboratory analytical data is to achieve the QC acceptance criteria of the analytical protocols. The accuracy and precision requirements for the VOC samples are incorporated into the CLP SOW OLC03.2 (groundwater) and CLP SOW OLM04.3 (soil).

A.7.1.1 Precision

Precision is a measure of the agreement between multiple measurements of the same property carried out under similar conditions. Precision thus reflects the reproducibility of the measurement. Precision is evaluated most directly by recording and comparing multiple measurements of the same parameter made on the same sample under similar conditions.

Precision is expressed in terms of the relative standard deviation (RSD) of the values resulting from the replicate analysis or the relative percent difference (RPD) between the values resulting from duplicate analysis.

Duplicate precision is evaluated by calculating a RPD using the following equation (the smaller the RPD, the greater the precision):

$$RPD = \frac{S - D}{(S + D)/2} \times 100$$

A.7.1.1.1 Field Precision

Field precision will be assessed through the collection and measurement of field duplicates and matrix spike/matrix spike duplicates (MS/MSD) samples. Field duplicates will be collected at a rate of one per 10 investigative samples. One MS/MSD will be submitted with every 20 investigative and duplicate samples. The total number of duplicates and MS/MSD samples for this field program is presented in the FSP Table 4-2.

A.7.1.1.2 Laboratory Precision

Precision in the laboratory will be assessed through the calculation of RPD. Because the concentration of analytes may be below detection limits in many environmental samples, the RPD data will be generated by preparing MS/MSDs.

A.7.1.2 Accuracy

Accuracy is a measure of the agreement between an observed value and an accepted reference value. It is a combination of the random error (precision) and systematic error (bias), which are due to sampling and analytical operations. The laboratory and method accuracy are calculated as a percentage using the following equation (the higher the value, the greater the accuracy):

$$\text{Accuracy} = \frac{\text{Measured value}}{\text{True Value}} \times 100$$

A.7.1.2.1 Laboratory Accuracy

Laboratory Accuracy will be assessed through the analysis of MS/MSDs, laboratory control samples (LCSs), and surrogate spikes.

MS/MSDs are evaluated by analyzing a spiked and unspiked portion of the same investigative sample. The objective is to equal or exceed the accuracy demonstrated for the analytical method on samples of similar matrix, composition, and contaminant concentration. The level of recovery of an analyte and the resulting degree of accuracy expected for the analysis of QA samples and spiked samples are dependent on the sample matrix, method of analysis, and the contaminant. The concentration of the analyte relative to the detection limit of the method is also a factor.

The accuracy of the laboratory procedures is also evaluated by the analysis of LCS and laboratory control spike duplicate (LCSD) samples. The LCS/LCSD sample set consists of a clean matrix that is spike with known constituents. The LCS/LCSD set is prepared and analyzed along with the environmental samples. The LCS/LCSD set is indicative of the accuracy of the laboratory techniques without possible sample matrix interferences.

The accuracy of sample matrix data will be evaluated by determining the %R of matrix spike, and surrogate spike samples where applicable. The spike recovery is calculated using the following equation:

$$\%R = \frac{\text{Observed spike sample conc. - Unspiked sample conc.}}{\text{True concentration of spike}} \times 100$$

A.7.1.3 Sensitivity

Sensitivity is the ability of the method or instrument to detect the contaminant of concern and other target compounds at the level of interest. Sensitivity is typically expressed in the form of detection limits.

A.7.2 Completeness, Representativeness, and Comparability

A.7.2.1 Completeness

Completeness is a measure of the amount of valid data obtained compared to the amount of data that was planned to be collected under normal conditions. Field and laboratory completeness are a measure of the amount of valid measurements obtained from all measurements taken for the project. Valid data will be defined as all data and/or qualified data considered to meet the DQOs for this project. It is expected that the CLP will provide data meeting QC acceptance criteria for 95 percent or more of all samples tested (critical samples).

A.7.2.2 Representativeness

Representativeness is a measure of the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. This is the degree to which samples represent the conditions for which they were taken.

A.7.2.2.1 Measures to Ensure Representativeness of Field Data

Representativeness is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the FSP is followed and that proper sampling techniques are used. The rationale for the sampling network and the sampling techniques are provided in the FSP.

Specific field procedures that will help ensure representativeness of specific samples includes:

- Collect samples representative of the entire sample interval
- Use appropriate sampling methodology and equipment
- Use appropriate sampling procedures, including equipment decontamination
- Perform sample procedures consistently and methodically

A.7.2.2.2 Measures to Ensure Representativeness of Laboratory Data

Using the proper analytical procedures, meeting sample-holding times, and analyzing and assessing duplicate samples ensures representativeness in the laboratory.

A.7.2.3 Comparability

Comparability is a measure of the degree to which one data set can be compared to another. Conditions of comparability include standardized siting, standardized sampling and analysis, consistency of reporting units and standardized data format.

A.7.2.3.1 Measures to Ensure Comparability of Field Data

Comparability is dependent upon the proper design of the sampling program and will be satisfied by adhering to the standard sample collection, standard analytical procedures, and standard reporting methods described in the FSP.

A.7.2.3.2 Measures to Ensure Comparability of Laboratory Data

The analytical data to be obtained during the sampling activities will be comparable to existing data by using similar sampling methods, analytical methods and QC objectives.

A.7.3 Levels of Quality Control Effort

A.7.3.1 Field Quality Control

Field blank, trip blank, duplicate, and matrix spike samples will be analyzed to assess the quality of the data resulting from the field sampling program. Field and trip blanks consisting of ultra pure water (laboratory grade) will be submitted to the analytical laboratories to assess the quality of the data resulting from the field sampling program. Field blank samples are analyzed to check for procedures at the site that may cause sample contamination. Trip blanks are used to assess the potential for contamination of samples due to contaminant migration during sample shipment and storage. Duplicate samples are analyzed to check for sampling and analytical reproducibility. Matrix spikes provide information about the effect of the sample matrix on the digestion and measurement methodology. All matrix spikes are performed in duplicate and are known as matrix spike/matrix spike duplicate (MS/MSD) samples.

The general level of the QC effort will be one field duplicate and one field blank for every 10 or fewer investigative samples (i.e., a 10 percent frequency). However, field blanks will only be collected for water samples and will consist of ultra pure water (laboratory grade). No field blanks will be collected for soil or sediment samples because the U.S. EPA Region V Central Regional Laboratory (CRL) discourages the use of water for soil/sediment field blanks. One volatile organic analysis (VOA) trip blank, consisting of ultra pure water (laboratory grade), will be included along with each shipment container of aqueous volatile organic compound (VOC) samples.

Field duplicates will be collected at a frequency of one per 10 project samples per parameter. Field duplicates will receive a unique sample identification number. Field duplicates are analyzed to check for sampling and analytical reproducibility.

MS/MSD samples are investigative samples on which additional analyses are performed. Matrix spikes provide information about the effect of the sample matrix on the preparation and measurement methodology. One MS/MSD and spike/duplicate sample will be collected/designated for every 20 or fewer investigative samples per sample matrix (e.g., soil, groundwater). Aqueous MS/MSD samples must be collected at triple the volume for VOCs. Soil MS/MSD samples for VOCs require additional volume when encore samplers are used. Field blanks, trip blanks, and field duplicate samples will not be used as MS/MSD samples.

Temperature blanks will be included in each cooler being shipped to ensure that the temperature in the cooler meets the specified requirements.

The specific level of field QC for samples collected as part of the Phase I RI/FS for the Ellsworth Industrial Park site is summarized by sample matrix and parameter in Table 4-2 of the FSP. Sampling procedures are specified in the FSP.

A.7.3.2 Laboratory Quality Control

All samples will be analyzed through the U.S. EPA CLP. Samples will be analyzed for volatile organic compounds. Groundwater samples will be analyzed using the CLP SOW OLC03.2. Soil samples will be analyzed using the CLP SOW OLM04.3.

A.8 SPECIAL TRAINING REQUIREMENTS/CERTIFICATION

Training of field staff will be provided to ensure that technical, operational, and quality requirements are understood. All field team members, will receive training including but not limited to, the following:

- Logbook training- Training for the maintenance of field, equipment, and personal logbooks.
- Health and Safety Training - All field staff will maintain health and safety training to ensure compliance with Occupational Safety and Health Administration (OSHA) as established in 29 CFR 1910.120 and 29 CFR 1910.126 (as applicable). This training includes but is not limited to, 40-hour OSHA HAZWOPER training, 8-hour annual HAZWOPER refresher training, 8-hour supervisor training, cardiopulmonary resuscitation (CPR), first aid training, blood-borne pathogens training, and hazardous materials shipping training.

- Data Validation Training - Team members who are responsible for an unbiased assessment of analytical data validation will be trained in accordance with the *U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, (October 1999) and U.S. EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (July 2002).*

- Other - The Site Manager will identify any other additional training for employees required to fulfill the RAC SOW.

All Health and Safety Training is documented by each WESTON office Health and Safety Officer and is accessible to the WESTON Health and Safety Officer and the WESTON QAO. All other training will be recorded in a matrix to ensure appropriate frequency is achieved. All certificates and/or documentation that records completion of training will be maintained in personnel files.

A.9 DOCUMENTATION AND RECORDS

A.9.1 Project Documentation

Project information generated by RAC will be documented in a format that is usable by all project personnel. Project data and information will be tracked and managed from its inception in the field to its final storage area. These evidentiary files (relevant records, reports, correspondence, logs, field notebooks, pictures, subcontractor reports, data, etc) will be maintained by the WESTON Site Manager (and the WESTON QAO, as applicable) in a secured, limited access area. These files will be maintained for a minimum of three years after project closeout and will be offered to the U.S. EPA prior to disposal. Documents and records that will be managed include but are not limited to:

- Sample Collection Records - Logbooks, field notes, data collection sheets, chain-of-custody records, custody seals, sample tags, phone conversation records, airbills, and corrective action reports.

- Project Data Assessment Records - Field sampling audit checklists, field analytical audit checklists, fixed laboratory audit checklists, performance evaluation (PE) sample results, data validation reports, phone conversation records, and corrective action reports.

- Laboratory Analytical Records - The analytical laboratory will be responsible for maintaining analytical logbooks, and laboratory data. Raw laboratory data files and electronic and hard copy data will be inventoried and maintained by the laboratory for the time period established by the U.S. EPA for the CLP. Laboratory data packages will contain the following information at a minimum: case narrative, calibration summary and raw data, mass spec tuning data (as applicable), gas chromatogram (as applicable), quality control summary forms and raw data, blank results, and method and instrument detection limits.

All incoming and outgoing correspondence or reports between WESTON and the U.S. EPA will be assigned a unique Document Control Number (DCN). A DCN number is assigned to each individual document contained in the project file.

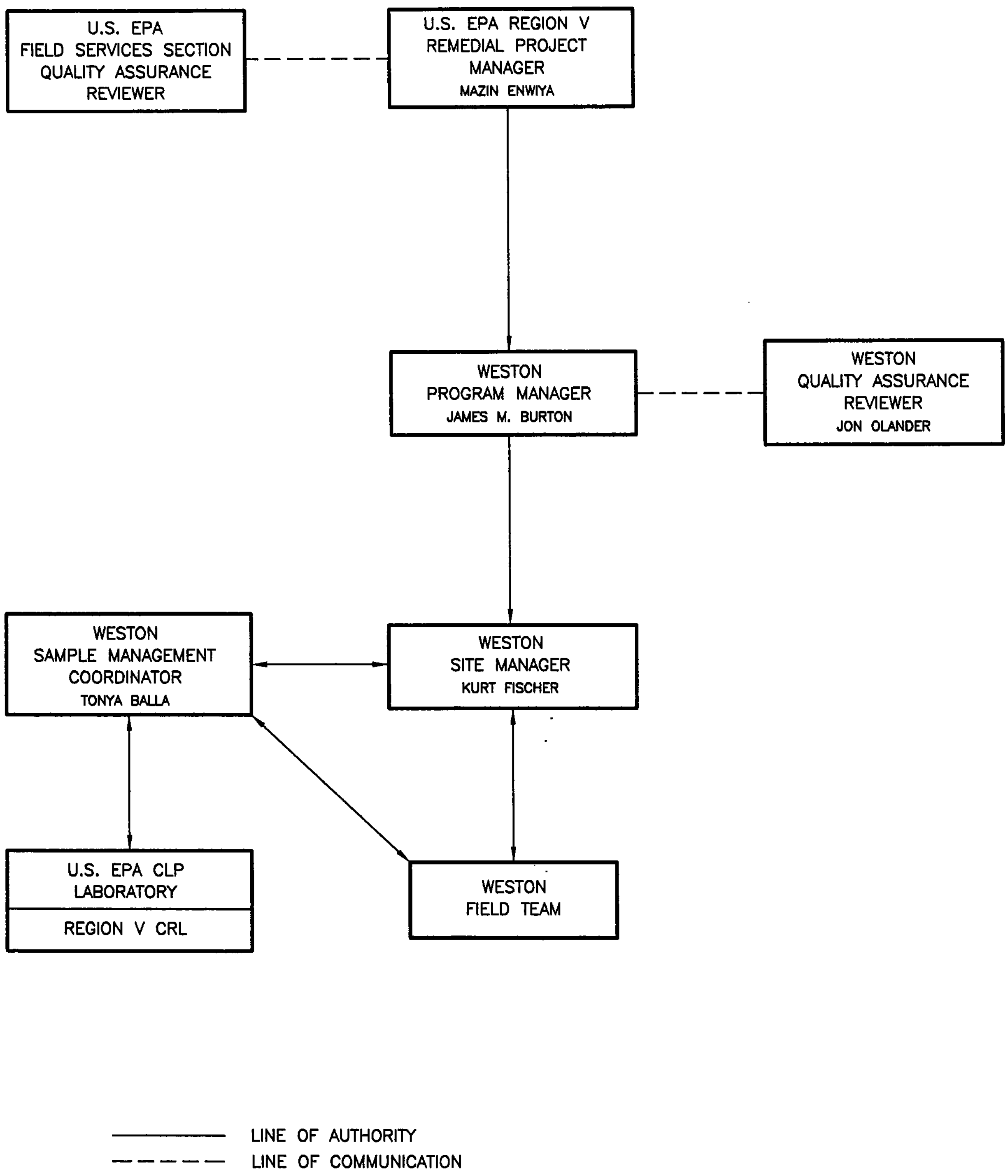

FIGURE A–1

RESPONSE ACTION CONTRACT
U.S. EPA CONTRACT No. 68–W7–0026
WORK ASSIGNMENT No. 155–RICO–B51W
DOCUMENT CONTROL No. RFW155–2A–A0HC

PROJECT ORGANIZATION CHART
ELLSWORTH INDUSTRIAL PARK
Downers Grove, Illinois

J:\CAD95\200\20803.dwg

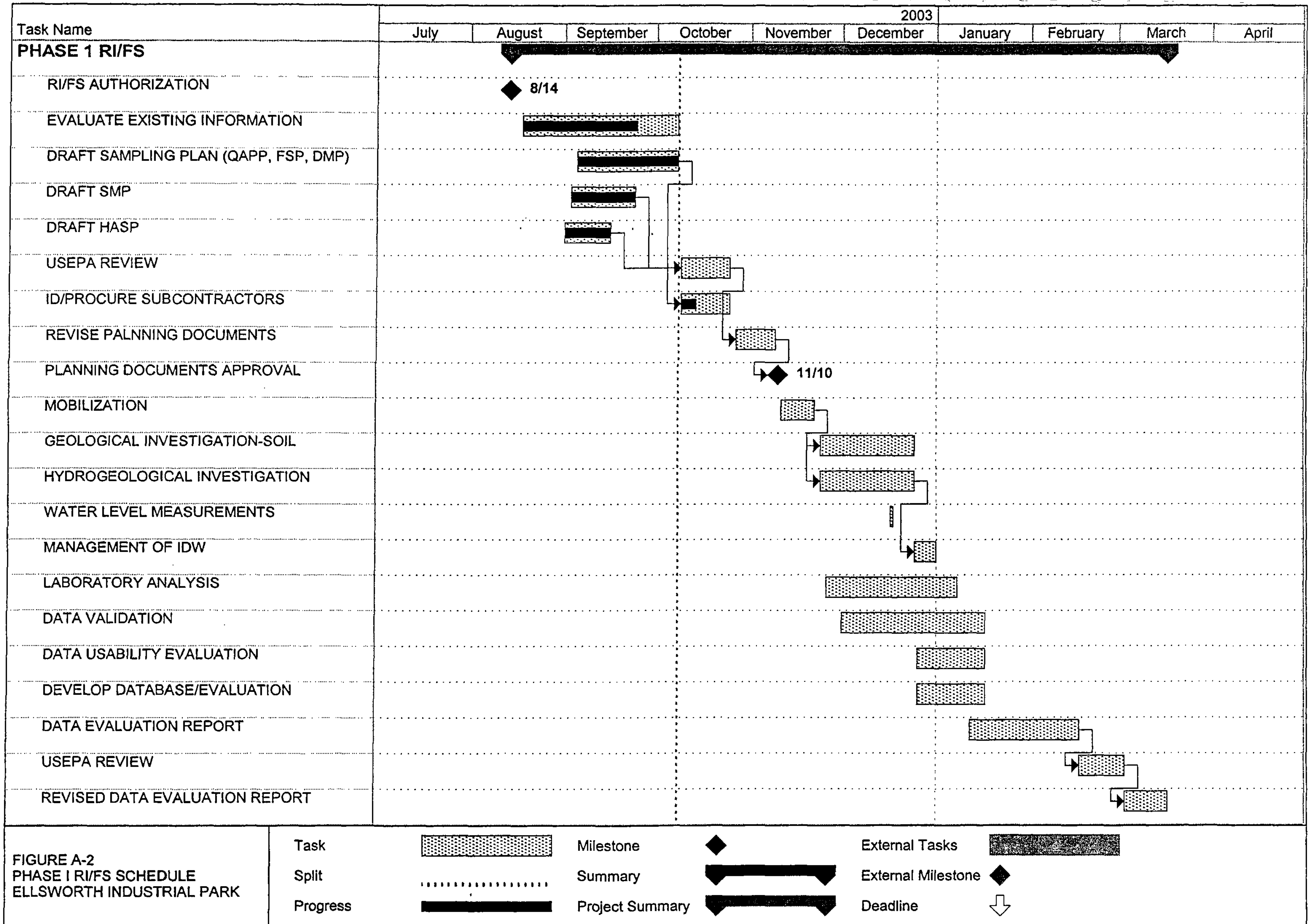

FIGURE A-2
PHASE I RI/FS SCHEDULE
ELLSWORTH INDUSTRIAL PARK

Table A-1

QAPP Distribution List
Ellsworth Industrial Park Site
Downers Grove, Illinois

QAPP Recipients	Title	Organization
Mazin Enwiya	Remedial Project Manager	U.S. EPA
Kurt Fischer	Site Manager	Weston Solutions, Inc.

Table A-2

DQO Steps for the Soil and Groundwater Study
Ellsworth Industrial Park Site
Downers Grove, Illinois

Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
STATE THE PROBLEM	IDENTIFY THE DECISIONS	IDENTIFY INPUTS TO THE DECISION	DEFINE STUDY BOUNDARIES	DEVELOP DECISION RULES	SPECIFY LIMITS ON DECISION ERRORS	OPTIMIZE SAMPLING DESIGN
Volatile organic compounds (VOCs) have been detected in the groundwater (glacial and bedrock aquifers) at levels exceeding the maximum contaminant levels (MCLs). Site contaminants appear to be migrating off-site. VOCs have been detected at numerous locations and depths in the soil within the Ellsworth Industrial park. PCE and TCE have been detected up to 500,000 ug/kg.	Are there additional properties with elevated VOC concentrations (soil or groundwater) which may be potential source areas?	Valid and defensible analytical data for VOCs for soil and groundwater will be compiled to determine if additional source areas exist. CLP SOW OLC03.2 will be utilized for groundwater analysis. CLP SOW OLM04.2 will be utilized for soil analysis.	Groundwater and soil samples from the 28 predetermined study properties will be sampled and analyzed for VOCs.	Groundwater results will be compared to federal maximum contaminant levels (MCLs) and Illinois TACO limits. Soil results will be compared to Illinois Tier I TACO limits for commercial / industrial and residential properties.	Properties exceeding groundwater or soil regulatory limits may be added to the existing potentially responsible party (PRP) group.	The group of 28 properties to be sampled for VOCs (soil and groundwater) was complied by the U.S. EPA. These properties are in and around the Ellsworth Industrial Park. Analytical methods have been selected so that target compound reporting limits are at or below the regulatory limits selected for the project.

SECTION B

DATA GENERATION AND ACQUISITION

B.1 SAMPLING PROCESS DESIGN

B.1.1 Sampling Network and Rationale

The project objectives described previously will be accomplished by collecting soil and groundwater samples, along with groundwater elevation data. The data are being collected to address potential additional source areas. The sampling locations and frequency will be discussed in the FSP.

B.1.2 Parameters to be Tested and Frequency

The Phase I RI/FS geological investigation of soil and sediment will consist of a shallow soil investigation using direct push Geoprobe equipment with direct sensing capability at each of the 28 properties and a limited hydrogeological investigation to assess site hydrogeological conditions to determine if site contaminants have impacted the shallow groundwater quality. All samples will be analyzed for VOCs. Field measurements of pH, specific conductance and temperature will also be collected from groundwater samples during the field investigation if sufficient volume remains or can be purged after completion of collection of groundwater sampling.

B.2 SAMPLING METHODS REQUIREMENTS

Sample Collection Procedures for the various sampling activities are described in the FSP. The FSP describes in detail: (i) sampling equipment; (ii) support facilities; (iii) decontamination of the sampling equipment; and (iv) sample storage, preservation, and holding times. Quality assurance during sample collection shall be achieved by following the procedures described in the FSP.

B.3 SAMPLE HANDLING AND CUSTODY REQUIREMENTS

B.3.1 Sample Containers and Handling

Table 4-3 of the FSP presents the required sample containers, sample preservation methods, and maximum holding times for the proposed environmental sampling. All samples will be placed in appropriate sample containers and labeled. The sample labels and sample tags will include sample number, location, date, and time of collection, and analyses to be performed. Tags will be provided by the U.S. EPA Region V RSCC. The labels and information for the sample tags will be created using the Forms II Lite software. Samples will be cushioned inside the shipping coolers using bubble wrap or vermiculite. The temperature of the samples will be maintained at 4 ± 2 ° C with sealed plastic bags of ice.

Samples will be shipped via commercial air courier on a daily basis (as feasible) to the analytical laboratory. The exception to this procedure will be for samples that are collected on a Sunday or a holiday. For samples collected on a Sunday or holiday, additional ice will be placed in the coolers or samples will be placed in a secure freezer. The coolers or freezer will be sealed and kept in a designated secure area until they are picked up by the courier on the next business day.

Prior to shipment, two custody seals will be fastened to the right and left sides of each shipping cooler to secure the lid and provide evidence that the samples have not been tampered with en route to the laboratory. Upon receipt of the cooler at the laboratory, the cooler will be inspected by the laboratory's sample custodian.

B.3.2 Documentation

Field efforts will be carefully documented using field notebooks, a Site logbook, field summary reports, sample chain-of-custody forms, sample labels, and custody seals. In addition, field copies of this QAPP, the FSP, the DMP, the SMP, and the Health & Safety Plan (HASP) will be kept on Site.

B.3.3 Field Log

A field logbook will be kept by the Field Team Leader to document site activities, field measurements, and interactions with subcontractors, sample information, descriptions of photographs, and other relevant information. The logbook will be a bound document with consecutively numbered pages. All entries will be made in ink with no erasures. If an incorrect entry is made, the information will be crossed out with a single strike mark, which will be initialed and dated by the person making the correction.

The following information will be recorded in the field logbook on a daily basis:

- Site location identification
- Start date and time (in military time format)
- Weather conditions
- Names of sampling team members
- Site visitors
- Level of personal protective equipment used
- Signature

When collecting environmental samples, the following information will be recorded in the field logbooks, on the sample labels, and on the sample tags:

- Unique sample identification number (discussed in the FSP and DMP)

- Date and time of sample collection
- Type of sample collected
- Samplers names
- Analyses to be performed on sample
- Preservatives used, especially any nonstandard types, and any other field preparation of the sample

In addition to the above information, the logbook will contain a detailed description of the sample location, and the samples physical characteristics (i.e. color, odor, etc).

B.3.4 Sample Custody–Overview

Sample custody is one of several factors necessary for the admissibility of environmental data as evidence in a court of law. Sample custody procedures help to satisfy the two major requirements for admissibility: relevance and authenticity. Sample custody is addressed in three parts: field sample collection, laboratory analysis, and final evidence files. Final evidence files, including all originals of laboratory reports and purge files, will be maintained under document control in a secure area. A sample or evidence file is under custody if the documents:

- Are in the possession of the individual
- Are in the view of the individual, after being in his/her possession
- Were in the possession of the individual before being placed in a secure location or are in a designated and identified secure area

B.3.5 Chain-of-Custody Form

Chain-of-custody forms will be used to track all samples from the time of sampling to the arrival of samples at the laboratory. Every sample container being shipped to the laboratory will contain a chain-of-custody form. Forms II Lite software will be used to generate the chain-of-custody form. The sampler will maintain their copy while the other copies are enclosed in a waterproof enclosure within the shipping container. The laboratory, upon receiving the samples, will complete the remaining copies and keep one copy for its records.

B.3.6 Field-Specific Chain-of -Custody Procedures

To ensure that samples will arrive at the laboratory without breakage and with the chain-of-custody intact, the following sampling and packaging procedures will be followed:

- The field sampler is personally responsible for the care and custody of the samples until they are transferred to another individual or properly dispatched to the laboratory. As few people as possible should handle the samples.
- All sample containers will be labeled with unique sample numbers and sample locations.
- Sample labels will be completed for each sample using waterproof ink unless precluded by weather conditions.
- The field team leader will review all field activities to determine whether proper custody procedures were followed during the field work.

B.3.7 Sample Shipping Procedures

The following transfer of custody and shipment procedures will be followed:

- Samples will be accompanied by a properly completed chain-of-custody record. The sample numbers and locations will be listed on the chain-of-custody record. When transferring the possession of samples, the individuals relinquishing and receiving will sign, record the date, and time on the record. This record documents transfer of custody of samples from the sampler to another person, to the laboratory, or to/from a secure storage area.

- Samples will be properly packaged for shipment and dispatched to the laboratory for analysis, with a separate signed custody record enclosed in each sample box or cooler. Shipping containers will be secured with custody tape for shipment to the laboratory. The cooler will be secured shut with packing tape. U.S. EPA provided custody seals (orange), for evidence purposes, will be taped to the cooler in at least two locations.

- Whenever samples are split with an independent source or government agency, a separate chain-of-custody record will be prepared for those samples and marked to indicate with whom the samples are being split. The person relinquishing the samples to the facility or agency will request the representative's signature acknowledging sample receipt.

- All shipments will be accompanied by the chain-of-custody record identifying the contents.

- If the samples are sent by common carrier, a bill of lading will be used. Receipts of bills of lading will be retained as part of the permanent documentation. Commercial Carriers will not be required to sign off on the custody records as long as the custody records are sealed inside the sample cooler and the custody seals remain intact.

B.3.8 Laboratory Chain-Of-Custody Procedures

The laboratory custody procedures and document control will be carried out according to the CLP SOWs or as specified in the individual CLP SOPs.

B.4 ANALYTICAL METHODS REQUIREMENTS

B.4.1 Analytical Laboratory Procedures

VOCs will be analyzed through a U.S. EPA Region V RAS contract using method OLM04.3 for soil samples and OLC03.2 for groundwater samples. Table B-1 presents the soil and groundwater VOC reporting limits. The actual detection limits obtainable for a specific sample depend upon sample characteristics and possible matrix interference. Departures from the detection limits will be consistent with CLP or other applicable requirements including method adherence, deliverables, audit procedures, and a performance evaluation equivalent to the QA/QC procedures in CLP SOWs.

B.5 QUALITY CONTROL REQUIREMENTS

B.5.1 Field Quality Control Checks

Field quality control checks are used to assess the representativeness of the sampling. They are designed to determine what effects activities such as sample collection, bottling, shipping, and storage have on sample integrity and to ensure that samples available for analysis in the laboratory are representative of actual conditions on Site. Field quality control checks, which will be conducted in accordance with the applicable procedures and frequencies described in this QAPP and FSP, including MS/MSDs, and field duplicates.

B.5.2 Laboratory Quality Control Checks

Internal laboratory QC procedures for the sample analyses are specified in the respective CLP SOWs. These specifications include the types of QC checks required (method blanks, reagent/preparation blanks, MS/MSD, calibration standards, internal standards, surrogate standards, the frequency of each audit, the specific calibration check standards, laboratory duplicate/replicate analysis), compounds and concentrations to be used, and the QC acceptance criteria for these audits.

Laboratory analysis will be conducted in accordance with the appropriate CLP SOW. Internal laboratory quality control checks include: (1) standardization, (2) reagent or method blank generation, and (3) surrogate and matrix spike addition and analysis.

B.6 INSTRUMENT/EQUIPMENT PREVENTIVE MAINTENANCE

B.6.1 Field Equipment/Instruments

Field measurement instrumentation includes but is not limited to OVMs, CGIs, pH meters, conductivity meters, water level meters, etc. Instruments will be calibrated daily in accordance with factory guidelines to ensure proper operation and maintenance Calibration records will be maintained in the field log book. Malfunctioning instruments will be replaced, as necessary. Spare parts for sampling equipment (i.e. geoprobe, coring tools, etc.) will be kept on-site whenever possible.

B.6.2 Laboratory Instruments

The primary objective of a preventive maintenance program is to help ensure the timely and effective completion of a measurement effort by minimizing the downtime of crucial sampling and/or analytical equipment due to expected or unexpected component failure. In implementing this program, efforts are focused in three primary areas; maintenance responsibilities; maintenance schedules, and adequate inventory of critical spare parts and equipment. Maintenance responsibilities for laboratory equipment will be assigned to the respective laboratory managers. The laboratory managers will then establish maintenance procedures and schedules for each major equipment item. These will be contained in the maintenance logbooks assigned to each instrument Preventative maintenance is covered in the CLP SOWs.

Along with a schedule for maintenance activities, an adequate inventory of spare parts is required to minimize equipment down time. This inventory emphasizes those parts (and supplies) which are subject to frequent failure, have limited useful lifetimes, or cannot be obtained in a timely manner should failure occur. The respective laboratory managers are responsible for maintaining an adequate inventory of spare part and backup instrumentation.

B.7 INSTRUMENT CALIBRATION AND FREQUENCY

Calibration procedures and frequency of laboratory instrumentation as specified in the U.S. EPA, or other approved methods will be strictly adhered to. Calibration of field instruments and equipment will be performed at approved intervals as specified by the manufacturer or more frequently as conditions dictate. Calibrations may also be performed at the start and completion of each test run. However, such calibrations will be reinitiated as a result of delay due to work-time breaks, work shift change, or in the event that damage is incurred. Calibration standards used as reference standards will be traceable to the National Institute of Standards and Technology (NIST), when possible. All calibration activities and results will be recorded in field log books.

B.7.1 Laboratory Instruments

Records of calibration, repair, or replacement will be filed and maintained by the designated laboratory personnel performing quality control activities. These records shall be filed at the location where the work is performed and will be subject to QA audit. For all instruments, the laboratory shall maintain a factory-trained repair staff with in-house spare parts or shall maintain service contracts with vendors. To facilitate data validation on selected analytical laboratory results, the laboratories will include calibration data deliverables required by CLP SOW in the raw data packages.

B.8 INSPECTION/ACCEPTANCE REQUIREMENTS FOR SUPPLIES AND CONSUMABLES

Guidelines for sample container procurement are detailed in Section 4.10 of the FSP.

B.9 DATA ACQUISITION REQUIREMENTS (NON-DIRECT MEASUREMENTS)

Historical data/background information is presented in section A.5 of the QAPP. Historical data was used to determine the parameters to analyze and the general locations that will be sampled. The current assessment will provide information on potential additional source areas and will provide additional information on the quality of the shallow groundwater.

B.10 DATA MANAGEMENT

B.10.1 Field Measurements and Sample Collection

Raw data from any field measurements and sample collection activities will be appropriately recorded in the field logbook. If the data are to be used in the project reports, they will be reduced or summarized, and the method of reduction will be documented in the report.

B.10.2 Laboratory Reporting and Record-Keeping

The CLP analytical laboratory will prepare and submit full analytical and QC data packages. The laboratory deliverables will include the following (as applicable):

- Narrative, including statement of samples received, description of any deviations from standard procedures, explanation of qualifications regarding data quality, and any other significant problems encountered during analysis.

- All QC data including Forms I to X; e.g., surrogate spike results for each sample, matrix spike, and matrix spike duplicate results, method blank results, and initial and continuing calibration checks.

- All inorganic QC data, including Forms I to Xm (e.g., spike and duplicate results, method blank results, and initial and continuing calibration checks).

- Field and laboratory chain-of-custody documentation pertaining to each sample delivery group analyzed.

- Tenatively Identified Compounds (TICs) will also be reported in accordance with Section IV, Unilateral Administrative Orders.

The Laboratory Project Manager will, as part of the data validation process, confirm that documentation is complete and legible; qualitative identifications are accurate; calculations are accurate; results are expressed in the appropriate units and number of significant figures; and the required quality control checks were run and met acceptance criteria. All pages in all data packages will be consecutively numbered. Review and approval of the data will be documented by the Laboratory Project Manager.

B.10.3 <u>Electronic Records</u>

Analytical data results for the VOC samples will be managed using EquIS data management software by Earthsoft, Inc.. The CLP laboratory will create an electronic deliverable document (EDD) that is compatible with the EquIS software. Additional data management and electronic record information is included in the DMP.

Table B-1

U.S. EPA Contract Laboratory Program Target Compound List (TCL) and Contract Required Quantitation Limits (CRQL) Ellsworth Industrial Park Site Downers Grove, Illinois

Parameter	Water (ug/L)	Soil (ug/kg)
Dichlorodifluoromethane	0.5	10
Chloromethane	0.5	10
Vinyl chloride	0.5	10
Bromomethane	0.5	10
Chloroethane	0.5	10
Trichlorofluoromethane	0.5	10
1,1-Dichloroethane	0.5	10
1,1,2-Trichloro-1,2,2-trifluoroethane	0.5	10
Acetone	5.0	10
Carbon Disulfide	0.5	10
Methyl Acetate	0.5	10
Methylene Chloride	0.5	10
trans-1,2-Dichloroethene	0.5	10
Methyl tert-butyl ether	0.5	10
1,1-Dichloroethane	0.5	10
cis-1,2-Dichloroethene	0.5	10
2-Butanone	5.0	10
Bromodichloromethane	0.5	---
Chloroform	0.5	10

Parameter	Water (ug/L)	Soil (ug/kg)
1,1,1-Trichloroethane	0.5	10
Cyclohexane	0.5	10
Carbon Tetrachloride	0.5	10
Benzene	0.5	10
1,2-Dichloroethane	0.5	10
Trichloroethene	0.5	10
Methylcyclohexane	0.5	10
1,2-Dichloropropane	0.5	10
Bromodichloromethane	0.5	10
cis-1,3-Dichloropropene	0.5	10
4-Methyl-2-pentanone	5.0	10
Toluene	0.5	10
trans-1,3-Dichloropropene	0.5	10
1,1,2-Trichloroethane	0.5	10
Tetrachloroethene	0.5	10
2-Hexanone	5.0	10
Dibromochloromethane	0.5	10
1,2-Dibromoethane	0.5	10
Chlorobenzene	0.5	10
Ethylbenzene	0.5	10
Xylene	0.5	10
Styrene	0.5	10
Bromoform	0.5	10
Isopropylbenzene	0.5	10

Parameter	Water (ug/L)	Soil (ug/kg)
1,1,2,2-Tetrachloroethane	0.5	10
1,3-Dichlorobenzene	0.5	10
1,4-Dichlorobenzene	0.5	10
1,2-Dichlorobenzene	0.5	10
1,2-Dibromo-3-chloropropane	0.5	10
1,2,4-Trichlorobenzene	0.5	10
1,2,3-Trichlorobenzene	0.5	---

Note: Groundwater samples - OLC03.2
Soil samples - OLM04.3

SECTION C
ASSESSMENT/OVERSIGHT

C.1 ASSESSMENT AND RESPONSE ACTIONS

Assessment of performance of both field and laboratory activities will be conducted to verify that sampling and analysis are performed in accordance with procedures established in the FSP and QAPP. Assessment will be performed in the form of audits. Audits of field and laboratory activities include internal and external audits.

Quality assurance system audits are conducted at least once during activities that may affect the integrity of the sampling program. The objectives of the system audits are:

- To verify that a system of quality control measures, procedures, reviews, and approvals is established for all activities that generate and process environmentally-related data.
- To verify that a system for project documentation (records, chain-of-custody forms, analytical tags, logbooks, worksheets, etc) is established.
- To verify documentation of the required quality control reviews, approvals, and activity records.
- To identify nonconformances with the established system of quality control measures, procedures, reviews, approvals, and documentation.
- To recommend corrective actions for identified nonconformance.
- To verify implementation of corrective action.
- To provide written reports of audits.

C.1.1 Field Performance Assessment

A field performance assessment (internal audit) may be performed by the WESTON Site Manager or his designee. The audit will include examination of sample collection, handling and packaging procedures, chain-of-custody, etc., to ensure compliance with the established requirements. The audit will occur at the onset of the project to verify that all established procedures are followed. Follow-up audits will be conducted as deemed by the QAO and/or project manager, to correct deficiencies and to verify that QA procedures are maintained throughout the entire project. Surveillance of field sampling and testing equipment will be performed by the field team leader.

External audits may also be conducted by the U.S. EPA Region V FSS. These audits may be scheduled or unannounced.

C.1.2 Laboratory Performance Audits

A laboratory system audit is a review of laboratory operations. It is conducted to verify that the laboratory has the necessary facilities, equipment, staff, and procedures in place to generate acceptable data. These audits may be performed by U.S EPA Region V.

A laboratory performance audit verifies the ability of the laboratory to correctly identify and quantify compounds in blind check samples submitted by the auditing agency. Performance audits will consist of the U.S. EPA sending performance evaluation (PE) samples to CLP laboratories for ongoing assessment of laboratory precision and accuracy. The analytical results of the analysis of PE samples will be evaluated by U.S. EPA to ensure that the laboratory maintains good performance.

External audits of laboratory activities are the responsibility of U.S. EPA Region V. The execution and frequency of these audits is at the discretion of the U.S. EPA.

C.1.3 Corrective Action

Corrective action can result from nonconformance to QAPP requirements. Corrective action may be required due to malfunctioning equipment systems and instruments, or equipment systems and instruments that fail calibration or generate data that exceed stated acceptance limits and may occur during sampling and handling, sample preparation, laboratory instrument analysis, and data review. It is the responsibility of the WESTON project manager to assure that corrective action be initiated as soon as possible.

For non-compliance problems, a formal corrective action program will be determined and implemented at the time the problem is identified. The person who identifies the problem is responsible for notifying the WESTON Site Manager, or his designee. Any nonconformance with the established quality control procedures in the QAPP or FSP will be identified and corrected in accordance with the QAPP. All changes will be evaluated based on their potential to affect the quality of the data. Information on these problems will be promptly communicated to the WESTON QAO and U.S. EPA RPM, as applicable. Implementation of corrective actions will be confirmed in writing through the same channels and documented in the site files.

Corrective actions will be implemented and documented in the field logbook. No staff member will initiate corrective action without prior communication of findings through the proper channels. If corrective actions are insufficient, work may be stopped by a stop-work order issued by the U.S. EPA RPM or the WESTON QAO.

For the CLP RASs, corrective action is implemented at several different levels. The laboratories participating in the CLP are required to have a written SOP specifying corrective action to be taken when an analytical error is discovered or the analytical system is determined to be out of control. The SOP requires documentation of the corrective action and notification by the analyst about the errors and corrective procedures.

If resampling is deemed necessary due to laboratory problems, the U.S. EPA must identify the necessary approach including cost recovery from the CLP for the additional sampling effort. The WESTON QAO must be notified in writing of all decisions.

C.2 REPORTS TO MANAGEMENT

As recommended in the Region V Model QAPP instructions, quality assurance reporting will be included as part of the project monthly status reports currently issued to U.S. EPA by the 20th day of each month. These reports will include projected delivery dates and schedule delays, results of performance or system audits, deviations from the QAPP or FSP and the associated corrective action and the usability of data. Additional quality assurance information will be included in the project final report.

SECTION D

DATA VALIDATION AND USABILITY

D.1 REVIEW, VALIDATION, AND VERIFICATION REQUIREMENTS

All data generated in field and laboratory activities will be reduced, reviewed and validated prior to reporting. No data will be disseminated by the laboratory until they have been subjected to the procedures, which are summarized below.

D.1.1 Data Reduction and Review

Raw data from field measurements and sample collection activities will be appropriately recorded in the field logbook. If the data are to be used in the project reports, they will be reduced and summarized, and the method of reduction will be documented in the report.

Laboratory data reduction procedures will be in accordance with the requirements of the CLP SOW OLM04.3 for soil and OLC03.2 for groundwater, both for VOCs. For each of the methods, the laboratory project manager will complete a thorough inspection of all reports prior to release of the data. Following review and approval of the preliminary report by the Laboratory Project Manager, final reports will be generated and signed by the Laboratory Project Manager.

D.1.2 Data Validation

U.S. EPA Region V ESAT will complete the data validation for the CLP samples analyzed under the U.S. EPA Region V RAS Contract. Completeness is evaluated by auditing the data package for:

- Chain-of-Custody records

- Technical holding times
- Required analytical methods
- Reporting limits
- Reporting format
- Laboratory and field QC reporting forms (blanks, calibrations, laboratory control samples, duplicates, matrix spikes, etc., as appropriate)
- Appropriate supporting data
- Case narrative
- Completeness of results

Details of any missing, incomplete or incorrect parts of the data packages will be stamped "Resubmitted on [date]", attached to the original data package, and returned to the analytical laboratory. All persons receiving data packages will receive copies of the resubmitted data from the laboratory.

D.2 VALIDATION AND VERIFICATION METHODS

Validation for data usability will be accomplished by comparing the contents of the data packages and QA/QC results to the requirements contained in the QAPP, the respective methods, and the laboratory SOPs. Raw data such as GC/MS and GC chromatograms and mass spectra, data reports and data station printouts will be examined to ensure that reported results are accurate.

The guidelines for data validation are presented in:

- Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses U.S. EPA, October 1999.

WESTON will also provide a data compliance check of the VOC data after receipt from the U.S. EPA.

D.3 USABILITY/RECONCILIATION WITH DATA QUALITY OBJECTIVES

Laboratory results will be assessed for compliance with required precision, accuracy, completeness, and sensitivity requirements as described in section A.7 of this QAPP. Data which do not meet the requirements specified in section A.7 and QA requirements in the analytical methods will be discussed in the data validation summaries and incorporated into the data assessment report for this project. Any sources of sampling or analytical error will be identified as early as possible during the sample collection activities so that corrective action can quickly be implemented. Data which are not deemed usable to support or address the project decision making process will be identified and the potential need for additional sampling will be discussed with all project parties.

SECTION 4

FIELD SAMPLING PLAN

4.1 INTRODUCTION

The Phase I RI/FS field investigation for the Ellsworth Industrial Park site will seek to determine additional potential sources related to the previously defined hazardous constituents at the site. The data collected during the field investigation will be used to provide technical support for the development and evaluation of remedial alternatives during the feasibility study (FS) process. The field investigation consists of the following activities:

- Geological investigations
- Hydrogeological investigations

This field sampling plan (FSP) presents the details of the field activities, discusses individual sampling rationale, and provides the field sampling procedures and protocols. Specifically, the FSP is organized as follows and addresses the following:

- Section 4.2-Sample Network Design and Rationale
- Section 4.3-Field Investigation Protocols
- Section 4.4-Field QC Samples
- Section 4.5-Sample Numbering System
- Section 4.6-Sample Documentation and Tracking
- Section 4.7-Sample Handling

- Section 4.8-Sample Team Organization
- Section 4.9-Management of Investigation-Derived Wastes
- Section 4.10-Sample Container Procurement

4.2 SAMPLE NETWORK DESIGN AND RATIONALE

The objectives of the field investigation at the site is to conduct further screening work at properties both within and outside the Ellsworth Industrial Park boundaries to identify other potential properties that may have contributed to the groundwater contamination associated with the site. Soil and groundwater samples will be collected from the 28 predetermined study properties and analyzed for VOCs.

Proposed field boring and sampling locations are identified on Figures 4-1 through 4-11. Boring and sampling locations were selected based on a review of available background data and information for each property, which included the potential for use of chlorinated solvent constituents, storage characteristics, waste storage or accumulation areas, etc. Historical aerial photographic analysis was also used to select boring and sampling locations. The description and rationale for each boring location is included in Table 4-1. The field locations will be identified and labeled with white paint prior to commencement of field activities. Adjustments to the proposed boring locations may alter slightly based on buried utilities at the sites, or other access limitations.

Exact measurements (vertical and horizontal) of boring and sample locations will be completed post boring execution. The U.S. EPA FIELDS group will survey boring and sampling locations using sub-meter accuracy GPS equipment.

4.2.1 Geological Investigations

Subsurface soil samples and downhole logging measurements will be used to characterize the subsurface contamination, the vertical extent of contamination, and the subsurface geology at each boring location. A total of 152 soil borings will be drilled and sampled during Phase I RI/FS field activities, with each of the 28 sites consisting of three to nine boring and sampling locations as shown on Figures 4-1 through 4-11. Two subsurface soil samples will be collected from each boring. To allow for additional discretionary soil sampling based on logging and field observations, it is assumed that one optional additional investigative soil sample may be collected at up to half the scheduled boring locations. Therefore, during this Phase I RI/FS, up to a maximum of 380 independent investigative subsurface soil samples may be collected during the investigation from a total of 28 sites. Corresponding quality control samples (field duplicates and MS/MSD samples) will be collected based on the frequencies described in the QAPP (Section 3). An estimated total of 418 samples (investigative and QC) will be collected during Phase I of the RI/FS investigation as shown on Table 4-2.

Downhole stratigraphic logging and VOC detection will be conducted by utilizing a Geoprobe® (or equivalent) equipped with a Membrane Interface Probe (MIP) and electrical conductivity (EC) system. The MIP/EC equipped probe will be advanced to the required boring depth of 30-feet bgs (or refusal) while taking continuous readings. Based on the results of the field screening, two to three independent subsurface soil samples will be collected from the vertical zones that exhibit the highest VOC readings. Each soil sample will be analyzed for VOCs. In the event that no defining VOC characteristics are observed with the MIP/EC logging equipment, two confirmation soil samples will be collected. Depths will be selected by the field geologist and will be based on encountered stratigraphy, presence of saturation, etc. It is expected that one sample will be collected in the upper 10 feet and a second sample will be collected at a deeper depth towards the base of any granular deposits encountered or just above an identified water table. If a water (perched or otherwise) is encountered, soil samples may be collected just above or below, if possible.

The results of the sample screening and downhole logging will be compared to the fixed laboratory analytical results to determine the vertical profile of subsurface contamination and the homogenous or heterogeneous nature of contamination. The VOC analyses will be used to determine the extent of contamination at the site and also determine whether the materials should be considered hazardous.

4.2.2 Hydrogeological Investigations

Groundwater quality and flow conditions will be assessed to further define the groundwater migration pathway. Water table elevation measurements will be collected to further delineate the direction of groundwater flow and hydraulic gradients within the investigation area. Stratigraphic information obtained during the Geoprobe® investigation will be used to identify potential groundwater migration pathways. Groundwater grab samples will be collected using Geoprobe® equipment to determine the presence and extent of groundwater contamination.

One groundwater sample will be collected at each of the scheduled 152 boring locations. To allow for additional discretionary groundwater sampling based on logging and field observations (e.g., if separate and distinct groundwater horizons are identified), up to one additional investigative groundwater sample may be collected at up to one-quarter (38) of the testing locations. Therefore, a total of 190 investigative groundwater samples may be collected as part of Phase I RI/FS field activities at the 28 properties. Corresponding quality control samples (field duplicates, field blanks, trip blanks, and MS/MSD samples) will be collected based on the frequencies described in the QAPP (Section 3). All groundwater samples will be analyzed for VOCs by CLP SOW OLC03.2.

The water table elevation, stratigraphic information, and the analytical sample results will be used together to assess site hydrogeological conditions and to determine if site contaminants have impacted the shallow groundwater quality (less than 30 feet bgs).

4.2.2.1 Groundwater Elevation Measurements

As part of hydrogeological investigation activities, one round of groundwater elevation measurements will be recorded for all existing known monitoring wells within the Ellsworth Industrial Park site for which access can be obtained. The depth to the water surface in each well will be measured with a water level indicator. Monitoring well locations have previously been identified and/or installed during the U.S. EPA and IEPA Site Assessments. Monitoring well locations are shown on Figure 4-12. Water level elevations will be calculated from available vertical survey data and depth to water measurements and will be plotted to create groundwater potentiometric surface maps.

4.3 FIELD INVESTIGATION PROTOCOLS

The following sections detail the procedures that will be followed during the field investigation at the Ellsworth Industrial Park site. Sample container preservation and volume requirements are outlined in Section 4.7.

4.3.1 Geological Investigations

4.3.1.1 Soil Boring, Downhole Logging, and Sampling

Soil Boring Geoprobe Procedures

Soil borings will be required for subsurface soil sampling, subsurface investigative MIP, and electrical conductivity logging. The proposed number of samples and type of analysis for soil boring samples is presented in Table 4-2.

The borings will be advanced using Geoprobe® (or equivalent) rig equipped with MIP and EC sensors. A qualified firm will be subcontracted to complete the soil borings. Decontamination will be in accordance with Subsection 4.3.3. All work will be under the direction of a WESTON field geologist. The following procedures will be used:

- Before commencing soil boring activities at any location, the subcontractor will decontaminate the working end of the Geoprobe rig, all Geoprobe equipment, and tools using a high-pressure steam cleaner. The subcontractor will avoid placing equipment, tools, and materials on the ground during the soil boring activities. The standard decontamination protocol for investigative boring equipment is presented in Subsection 4.3.3.

- A Geoprobe rig using 1.5-inch diameter rods will advance the borings to the desired depths. Geoprobe rigs must be capable of entering multi-terrain areas as needed based on site conditions.

- Each boring location will be continuously logged using MIP/EC. The soil conductivity will be measured by utilizing a dipole measurement arrangement in the MIP where an alternating electrical current is passed form the isolated pin at the center of the probe to the probe body. The voltage response of the soil to the imposed current is measured across the same two points. The probe measures soil conductivities ranging from 5 to 400 mS/m. Soil stratigraphy will be defined using the soil conductivity portion of the MIP probe, where lower conductivity measurements relate to sands and gravels and higher conductivity measurements relate to silts and clays.

- The permeable membrane portion of the MIP is used to detect VOCs in both saturated and unsaturated soils during its advancement. VOCs in the subsurface come in contact with the heated surface of the MIP polymer membrane and partition (absorb) into the polymer membrane. VOCs in the gaseous, dissolved, solid, or free-product phase can partition into the membrane. Once VOC molecules are sorbed onto the membrane, they move by diffusion across the membrane to areas of lower concentrations. Movement across the membrane is very rapid because it is heated from 80-125 degrees Celcius and is relatively thin. Once through the membrane, the VOCs partition into the carrier gas which is in contact with the back side of the membrane. It takes approximately 25-35 seconds for the carrier gas to travel through the MIP trunk line before it reaches the on board photoionization detector (PID), used to quantify the total VOC concentration.

- Soil samples will be collected from two to three depths at each soil boring location. Those locations will be identified during the initial investigation utilizing the MIP technology. Samples will be collected from an additional boring immediately adjacent to the original boring utilizing standard Geoprobe soil sampling tools and equipment technology without the MIP attached (discussed in next section).

- Each MIP/EC boring will continue to a maximum depth of 30 feet bgs, or until probe refusal.

- Soil borings will be abandoned by injecting a bentonite grout into the borehole using tremmie methods. Alternately, if the borehole does not significantly collapse, granular bentonite may be used to abandon boreholes. Any remaining soil cuttings will be placed in a 55-gallon drum and managed according to the requirements specified in Section 4.9.

Soil Boring Sampling Procedure

Soil samples will be collected by the secondary Geoprobe rig at the depths specified during the MIP/EC investigation. The samplers (Macrocore) and associated equipment that contacts the samples will be decontaminated between samples in accordance with the requirements outlined in Subsection 4.3.3. Following removal from the borehole, the disposable Geoprobe Macrocore liner (polyethylene) will be opened on a clean surface (e.g., polyethylene sheeting). Each core will be qualitatively screened for VOCs utilizing an Organic Vapor Monitor (OVM). Macrocore samples may be of either the open or closed piston system types depending on subsurface sampling conditions and sample depth. For example, if samples are to be collected from the upper four feet of sediments, an open macro core sampler may be utilized. However, if samples are to be collected from depths greater than four feet and/or borehole collapsing is suspected, the closed piston type sampler will be used to ensure samples are collected from the desired horizon.

The number of samples and the types of analyses are shown in Table 4-2. Based on the results of the sample logging with the MIP/EC and field screening with an OVM, two to three soil samples will be collected from each borehole at those depths identified as most likely to contain VOCs.

Sample intervals retained for laboratory analysis will be collected according to the following protocol. For VOA samples, sample collection will commence immediately upon opening the Macrocore sampler disposable liner in order to minimize the loss of any VOCs. Sample material from the selected undisturbed sample interval will be collected in three 5-gram Encore samplers. No mixing or compositing will be performed on the sample material, thereby limiting the loss of VOCs from the sample.

Additional sample volume will be collected so the laboratory can determine moisture content. This additional sample material will be collected in a 2-ounce glass sample jar.

4.3.2 Hydrogeological Investigations

4.3.2.1 Groundwater Sampling During Drilling

At each location where groundwater is encountered, one to two groundwater samples will be collected from the soil boring using Geoprobe grab groundwater sampling equipment (i.e., Geoprobe Screenpoint 15 groundwater sampling device). Groundwater will be sampled using a peristaltic pump as the primary sampling devise. In the event that the peristaltic pump proves ineffective and is unable to withdraw groundwater due to depth or insufficient recharge, a secondary pump consisting of a small diameter bladder pump will be employed for sample collection. If this pump proves inneffective also due to low recharge or extremely silty conditions, a stainless steel or disposable mini-bailer will be used to collect samples. The selection of equipment will be made by the field geologist based on observed water levels and potential for recharge to the rod string from the target saturated zone. All downhole equipment that are not dedicated will be decontaminated pursuant to the protocols outlined in Subsection 4.3.3. Each sample will be collected using the following methodology:

- The Geoprobe Screenpoint 15 groundwater sampler will be advanced to the selected depth. The rods will be pulled back to expose the screen to the water bearing formation, allowing groundwater to enter the rod string.
- The depth to the water level in the rod string and the total depth will be measured with an electrical sounding device (accuracy ±0.01 feet). The depth to water and the time of measurement will be recorded. The reference point for these depths will be the top of the ground surface.

- The volume of standing water in the rod string will be calculated.
- A peristaltic pump, bladder pump, or disposable bailer will be used for purging and sampling.
- A minimum of three well volumes will be removed from the rod string. After removing the third volume, a field measurement of pH, specific conductance, and temperature will be recorded in the field notebook. If sufficient groundwater recharge is present, purging will continue until the measurements for all three parameters have stabilized (±0.1 units for pH, ±10 percent for specific conductance and ± 1°C) for three consecutive rounds of readings. A maximum of five temporary well volumes will be purged during sampling. WESTON standard operating procedures (SOPs) for measuring pH, conductivity, and temperature are presented in Appendix A.
- If insufficient groundwater is available and/or the rod string runs dry before three volumes have been removed, the sampler will be allowed to recharge for 15 minutes and then will be pumped dry again and allowed to recharge before sampling.
- Samples will be collected directly from the pump or bailer after purging has been completed. Samples will be collected for VOCs. All samples will be collected unfiltered.
- Sample bottles will be filled at an angle in order to limit splashing and bubbling. The VOA sample bottles will be filled such that no air space is present in the bottle after it is capped. If bubbles appear after the bottle is capped, a new sample will be collected. A new, preserved VOA container will be used to collect the sample. If bubbles persist, an unpreserved sample will be collected (the Field Sample Manager will note the absence of the preservative on the sample paperwork and in the field logbook).
- Samples will be maintained at 4°C with cold packs or ice after sample collection.

The sample container, volume and preservation requirements are presented in Table 4-3.

4.3.2.2 *Groundwater Elevation Measurements*

Water level measurements at the monitoring wells will be collected following the WESTON SOP

(Appendix B) and using the following protocols:

- The water level probe and cable will be decontaminated before each use with a distilled water rinse.
- Depth to water will be measured with an electrical sounding device (accuracy ±0.01 ft). The reference point for this measurement will be the top of the inner well casing.
- The depth to water and the time will be recorded in a field logbook.

4.3.3 Decontamination Procedures

All sampling equipment including pumps, tubing, stainless steel spoons, spatulas, scoops, bowls, etc., will be decontaminated before being used to collect a sample. The decontamination protocol for sampling equipment is presented in Table 4-4.

The working end of the Geoprobe rig and all downhole and associated boring equipment, tools and materials will be decontaminated prior to intrusion at each new soil boring. Only decontaminated equipment will be placed in a boring. All boring-related equipment will be decontaminated in accordance with the protocols presented in Table 4-5.

The management of water generated during decontamination will be in accordance with the requirements outlined in Section 4.9. All decontamination wastewater will be containerized.

A temporary decontamination pad will be constructed at the site. The pad will consist of heavy plastic lining anchored by railroad ties and/or clean aggregate materials. The grade will be modified to accommodate temporary storage of rinse water by constructing a trench at one end of the pad. The pad dimensions shall be large enough to accommodate the Geoprobe rig.

4.4 FIELD QUALITY CONTROL SAMPLES

The sampling effort at the Ellsworth Industrial Park site will include the following types of field QC samples:

- Field duplicates.
- Matrix spikes/matrix spike duplicates.
- Field blanks.
- Trip blanks.

Section A.7.3 of the Ellsworth Industrial Park site QAPP (Section 3) explains the purpose behind each type of QC sample. Sample containers and handling and shipment procedures that will be used are identical to those used for the investigative samples. Each field QC sample will be documented on a chain-of-custody form. Table 4-2 shows the specific level of QC effort for field activities. The following subsections detail the collection procedures for each QC sample type.

4.4.1 Field Duplicate Samples

Field duplicate samples will be collected at selected locations during soil and groundwater sampling at a 1-per-10 sample frequencies, using procedures identical to those used for the investigative samples. Duplicate samples will be analyzed for the same parameters as the investigative sample unless otherwise stated elsewhere in the FSP or QAPP. Duplicate samples will be collected by alternatively filling two sets of sample bottles from the same sample unit (e.g., bailer, split spoon, scoop, etc.). Where Encore samplers are utilized for soil sampling, duplicate samples will be collected directly adjacent to the location within a sample core where the investigative sample was collected. No mixing or compositing of samples will be conducted. For samples requiring chemical analyses, the VOA fraction for each duplicate sample will be collected immediately after the VOA fraction for the investigative sample to minimize the loss of VOCs during sample collection.

4.4.2 Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike/matrix spike duplicate samples (MS/MSDs) will be collected on a one per 20 sample (or less) basis for soil and groundwater sampling. MS/MSD samples are investigative samples on which MS/MSD analyses are performed. MS/MSD analyses only apply to organic samples. Investigative soil and sediment samples assigned for MS/MSD do not require the collection of extra sample volume. However, soil collection in Encore samplers requires two additional 5-gram Encore samplers for each MS/MSD sample. Extra sample volume is required for aqueous MS/MSD analyses. For groundwater MS/MSD analyses, triple the normal volume is required for volatile organics.

Field blank, trip blanks and field duplicate samples will not be used as MS/MSD samples. All MS/MSD will be identified as such on all sample paperwork.

4.4.3 Field Blanks

Field blank samples will be collected during all water sampling events. One field blank will be collected for every 10 or fewer investigative aqueous samples collected during the field sampling activities. For groundwater samples, field blanks will be obtained by pouring ultra-pure water (laboratory-grade water) over and through a decontaminated or disposable sampling device such as a bailer or Screenpoint 15 sampler, and collecting the water in the required sample containers. All disposable sampler parts such as tubing will be replaced with unused or decontaminated equipment prior to collecting the field blank. Each field blank will be analyzed for the same parameters as the investigative samples in accordance with the same analytical methodologies. The U.S. EPA Region V CRL discourages the use of water blanks for soil and sediment samples; therefore, no field blanks will be collected for soil and sediment samples.

4.4.4 Trip Blanks

One trip blank sample will be enclosed in each sample shipment container in which aqueous VOA samples are included. All sample handling, volume, packaging and preservation requirements for the trip blank will be identical to the investigative VOA samples. The trip blanks will be obtained by pouring ultra-pure water (laboratory-grade water) directly in the sample containers under laboratory-type conditions as soon as it is practicable (given the sample holding time) prior to the beginning of a field sampling event. The trip blanks will then be subsequently placed in a sample shipment container and accompany field personnel to the site. The trip blank will be documented and identified as such on all sample documentation.

4.5 SAMPLE NUMBERING SYSTEM

All samples for analysis, including QC samples, will be given a unique sample number. The sample numbers will be recorded in the field logbook, the chain-of-custody, and the shipment documents.

WESTON will assign each sample a project sample number. The project sample number highlights the sample matrix and location, and will be used for documentation purposes in field logbooks, as well as for presentation of the analytical data in WESTON memoranda and reports.

4.5.1 Project Sample Numbering System

The project sample numbering system will be composed of the following components:

Project Identifier

The first part of the project sample number will consist of a three-character designation. This three-character code will be used to identify the Ellsworth Industrial Park site and the phase of the field investigation. **EIP** corresponds to Ellsworth Industrial Park site field investigation.

Sample Type and Sample Location

This shall consist of the following:

- A two-character sample type code. For the proposed types of field sampling, the following codes may be utilized during this phase or subsequent investigation phases, as applicable:

  GP - Geoprobe soil boring subsurface soil sample
  GPW - Geoprobe grab groundwater sample
  TW - Temporary well groundwater sample
  MW - Monitoring well groundwater sample
  RW - Residential well sample
  PW - Municipal water supply well sample
  SS - Surface soil (0 to 24 inches)
  SW - Surface water sample
  SD -Sediment
  DS - Drum sample solid
  DL - Drum sample liquid
  LS - Lagoon sediment

- A sample location code. The above sample type code will be combined with sample location identification (e.g, GP02 for Geoprobe soil boring "GP02," MW02 for monitoring well "MW02"). For field blanks and trip blanks, the two-character sample type code will be combined with FB for field blanks and TB for trip blanks (e.g, MWTB for a monitoring well trip blank).

<u>**Sequence Identifier**</u>

This shall consist of the following:

- A two-digit sequence number that tracks the number of samples collected from a specific location. Sequence 01 refers to the first sample interval, and sequence 02 refers to the second sample interval. Sample depths will not be a part of the sample code; rather, depth information will be recorded in the site field logbook and presented with the analytical results.

- If the sample is a field duplicate sample, the above will be combined with DP. If the sample is a matrix spike/matrix spike duplicate sample, the above will be combined with MSD.

- For field and trip blanks, the two-digit sequence number will denote the sequential number of field or trip blank sample collected for that sample type.

- Field duplicate samples will be submitted without reference to the laboratory (i.e., the laboratory will not be informed that the sample is duplicate).

Some examples of the WESTON project sample numbering system are as follows:

1. EIP-GP02-01DP: Ellsworth Industrial Park site; Geoprobe soil boring location 2; duplicate of first soil sample collected at this location.

2. EIP-GPW03-01: Ellsworth Industrial Park site; Geoprobe grab groundwater sample 3; first groundwater sample at this location.

3. EIP-SWTB-01: Ellsworth Industrial Park site; surface water sampling, first trip blank sample.

4. EIP-MWFB-03: Ellsworth Industrial Park site; monitoring well water sampling, third field blank sample.

5. EIP-MW01-01MSD: Ellsworth Industrial Park site; monitoring well location 1; first sample collected at this location; sample is a matrix spike/matrix spike duplicate sample.

4.6 SAMPLE DOCUMENTATION AND TRACKING

4.6.1 Field Records

Field Log Book

Field observations and other information pertinent to the collection of samples will be recorded in the field. All entries will be made in a bound logbook in ink. The entries will be detailed and descriptive so that a particular situation can be recalled without reliance on the collector's memory. Log books will be identified by unique sequential numbers. The data to be recorded for each sample will include date, time (24-hour military time reference), sample number, sample location, sample appearance, and name of the persons collecting the sample. In addition, general information will be recorded in the logbook daily, including personnel present at the site, level of protection being worn, and weather. Photographs will also be taken and logged to document sampling activities.

Geologic/Drilling Log

Drilling information will be recorded into the field log book, field data collection forms, or digital/electronic device and transferred to a geologic drill log. A separate log will be maintained for each boring. Instrument readings from the OVM used for field screening and health and safety monitoring will be recorded in the notes column of the log. Upon completion of the field work, the drill log information may be entered into a computer database as appropriate.

Field Measurement Data

Measurements of field parameters will be recorded in the field log book, field data collection forms, or digital device, including (as appropriate):

- Date, time and individual performing the measurements
- Sample location
- Weather conditions
- Parameter to be measured
- Model number of instrument used
- Calibration performed, including readings from calibration checks performed
- Reading

The units to be used for water quality parameters will include the following and/or others, as appropriate:

- pH units to the tenths decimal place
- Water level in feet to the one-hundredths decimal place
- Temperature in degrees Celsius, to the tenth of a degree
- Conductivity in µmhos to the tenths place

Sample Collection Information

Samples collected will be recorded in the field log book, field data collection forms, or digital device with the following information, as appropriate:

- Sample location
- Depth of sample collection
- Sample matrix
- Sample identification number
- Date and time of collection
- Any unusual appearances of the sample
- Parameters to be analyzed
- Date and time sample was released or received

4.6.2 Field Chain-of-custody Procedures

Field chain-of-custody (COC) procedures are presented in the QAPP, with a detailed summary in Subsection B.3 of the QAPP. Details on the completion of field sample COC documentation are discussed in Subsection 4.6.3 of the FSP.

4.6.3 Sample Documentation Forms

Required paperwork for laboratory samples includes chain-of-custody (COC), sample tags, and COC seals. All sample documentation forms will be completed by WESTON personnel in accordance with the requirements outlined in the *CLP* Guidance for Field Samplers (U.S. EPA April

2003) or the most recent version. The U.S. EPA is currently using the Forms II Lite Software (Version 5.1). The U.S. EPA Region V RSCC is responsible for providing WESTON with updates on changes in the sample documentation forms and requirements. The WESTON Sample Management Coordinator (SMC) will train all field personnel on any new documentation requirements before field activities begin.

All paperwork accompanying the samples being shipped to the laboratory will be sealed in a plastic bag that is taped to the inside of the cooler lid. Copies will be made of all sample documentation and retained for in-house files.

Chain-of-Custody/SAS Packing List Form

U.S. EPA's registered FORMS II Lite program will be used to document samples shipped to U.S. EPA or U.S. EPA designated CLP laboratories. U.S. EPA OERR's Analytical Operations/Data Quality Center (AOC) developed the Field Operations and Records Management System (FORMS) II Lite to generate sample labels and Traffic Reports and Chain of Custody (COC) forms. The system also tracks samples from the field to the laboratory and facilitates electronic capture of sample information into databases as well as exports data electronically as .xml, .dbf, or .txt files.

To maintain custody in accordance with the U.S. EPA requirements, the following sample documentation protocol must be implemented:

- Each sample shipment container must have at least one COC form enclosed with the samples.
- Each sample in a shipment container must be identified and documented on the accompanying COC form.

- The COC seal numbers on seals assigned to a particular cooler must be documented on the COC form in that cooler.

- The carrier service person does not have to sign the COC form if the custody seals remain intact. The airbill number must be written on the COC form.

Chain-of-Custody Seals

Chain of custody seals are provided by the U.S. EPA Region V RSCC.

- Two seals will be used per shipping container to secure the lid and provide evidence that the samples have not been tampered with.

- The COC seals must be covered with clean tape to avoid accidental damage during shipment.

- The COC seal numbers must be documented on the COC form.

- All sample shipment containers require COC seals.

Sample Tags

Sample tags are provided by the U.S. EPA Region V RSCC. They are specific to Region V. The information that is printed out for the sample label will be printed in duplicate and the copy will be affixed to the sample tag. Sample tags will be utilized for CLP RAS and SAS analyses.

- Each sample container must have a Sample Tag affixed to it with a string.

- Sample Tag numbers are recorded on the COC form.

4.7 SAMPLE HANDLING

4.7.1 Sample Containers and Sample Preservation

All samples collected for analysis will be containerized, preserved, packaged and shipped in accordance with *U.S. EPA Region V CRL Sample Handling Manual*, (U.S. EPA, 1989), *CLP Guidance for Field Samplers* (U.S. EPA, 2003), The U.S. Department of Transportation's regulations (49 CFR 173 to 177) and *Dangerous Goods Regulations*, (International Air Transport Association (IATA), (2003). Table 4-3 identifies the required sample containers, sample volumes, sample preservation requirements, and holding times associated with all parameters and media applicable to the Ellsworth Industrial Park site field investigation. WESTON will obtain sample containers according to U.S. EPA specifications as described in Section 4.10.

4.7.2 Sample Packaging and Shipment

All samples shipped from the Ellsworth Industrial Park site must be shipped in accordance with U.S. Department of Transportation regulations and must comply with *Dangerous Goods Regulations* (IATA, 2003) if shipped by air transportation.

Following sampling, the exterior of all sample bottles will be initially decontaminated near the sampling location by wiping with a moist cloth. The filled sample containers will not be sprayed with water during decontamination because this water could contact the sample if the container was not tightly sealed. In preparation for shipment to the CLP laboratories, all samples will be packaged in accordance with the following general procedures:

- Check to make sure container cap is securely tightened. Seal with tape. Mark liquid levels of water samples if bottles are partially full.

- Make sure the sample names and sample tags are securely attached to the sample containers. Place each container in a zip-lock baggie, ensuring that the sample tags can be read.

- Samples will be placed in a shipment container lined with a large polyethylene bag. Enough vermiculite or equivalent absorbent material will be packed around the samples to minimize the possibility of sample container breakage. The temperature will be maintained at 4° C with cold packs or ice sealed in plastic bags as appropriate to the sample. The remaining space in the container will be filled with additional packing material and the large bag sealed.

- Place COC forms in a zip-lock bag and tape to inside of shipment container lid.

- Close shipment container and seal it shut with strapping tape. If shipment container has a drain port, seal it shut with tape. Place custody seals across seam between the container lid and base so that custody seal would be broken if shipment container was opened. Cover custody seals with waterproof tape.

- Affix airbill with shipper's and recipient's names and addresses to top of shipment container. Affix a second mailing label with the same information to the top of container in case airbill becomes detached from container during shipment. Place "This End Up" labels on container as specified by IATA.

The WESTON FTL must contact the WESTON SMC to confirm sample shipment dates for all analyses. The FTL will notify the SMC of any last-minute changes in sampling schedule that will affect the sample shipment schedule.

4.8 SAMPLE TEAM ORGANIZATION

The sampling team organization is discussed in Subsection A.4 of the QAPP.

4.9 MANAGEMENT OF INVESTIGATION-DERIVED WASTES

For purposes of this FSP, investigative-derived wastes (IDW) are defined as any by-product of the field activities that is suspected or known to be contaminated with hazardous substances. The performance of field activities will produce waste products such as spent drilling mud, development and purge groundwater, decontamination wastewater, drill cuttings, and expendable personnel protective equipment. As much as possible, the drill cuttings from the soil borings will be put back in the soil borings. The remaining drill cuttings will be containerized in 55-gallon drums.

In order to collect the decontamination wastewater, a portable or temporary decontamination pad will be set up on site. Wastewater will be pumped from the decontamination pad, collected, and containerized. Wastewater and purge water from the developing and sampling of groundwater will be stored in DOT-approved drums. Composite disposal samples will be collected and analyzed. Sampled wastes will be disposed of in an offsite waste disposal facility.

Each type of waste will be segregated during the field activity and containerized separately. All storage containers will be labeled appropriately. Wastes will be stored at the site in a secured staging area until the analytical results of the site investigation are interpreted. At that time, each segregated waste will be evaluated based on the field data and disposal arrangements executed in accordance with appropriate local, state, or federal regulations. If deemed appropriate, the management of the wastes will be incorporated into the remedial action for the site. WESTON will refer to the U.S. EPA's *Management of Investigation-Derived Wastes During Site Inspections* (U.S. EPA, 1991) for guidance on off-site disposal policy, if this action is deemed necessary.

4.10 SAMPLE CONTAINER PROCUREMENT

All sample containers being used for chemical analysis to be used during the Ellsworth Industrial Park site sampling program will be procured by WESTON. All sample containers (bottles) will be prepared according to the procedures specified in U.S. EPA's *Specifications and Guidance for Obtaining Contaminant-Free Sample Containers*, (U.S. EPA, 1992) or the most current revision. It will be ensured that the bottles used for the sampling activity do not contain target organic and inorganic contaminants exceeding the level specified in the above-mentioned document. Specifications for the bottles will be verified by checking the supplier's certified statement and analytical results for each bottle lot, and will be documented on a continuing basis. The field team leader or the leader's designee will record the bottle lot numbers (if applicable) associated with each sample collected during the Ellsworth Industrial Park site sampling effort. This data will be maintained in the project evidence file and will be available, if requested, for U.S. EPA review.

In addition, the data for field blanks and trip blanks will be monitored for contamination, and corrective actions will be taken as soon as a problem is identified. This will be accomplished either by discontinuing the use of a specific bottle lot, contacting the bottle suppliers for retesting the representative bottle from a suspect lot, resampling the suspected samples, validating the data (taking into account that the contaminants could be introduced by the laboratory (e.g., by common laboratory solvents, sample handling artifacts) or could be bottle QC problems) so as to make an educated determination if the bottles and hence, the data are still usable, whichever is appropriate.

For the Ellsworth Industrial Park site, the corrective actions will be conducted comprehensively to avoid the use of identified contaminated lots from other projects, and to ensure that if the bottle suppliers are deemed unresponsive or unable to provide cleaned bottles as specified, then other U.S. EPA-related projects are not negatively affected by the use of the noncompliant bottles.

If resampling is deemed necessary, WESTON will require authorization for additional effort. Any schedule delays will be brought to the attention of the U.S. EPA RPM/WAM.

FIGURE 4-1

RESPONSE ACTION CONTRACT	BORING LOCATION MAP
U.S. EPA CONTRACT No. 68-W7-0026 WORK ASSIGNMENT No. 155-RICO-B51W DOCUMENT CONTROL No. RFW155-2A-AOHC	FORMER WWTP PROPERTY ELLSWORTH INDUSTRIAL PARK SITE Downers Grove, Illinois

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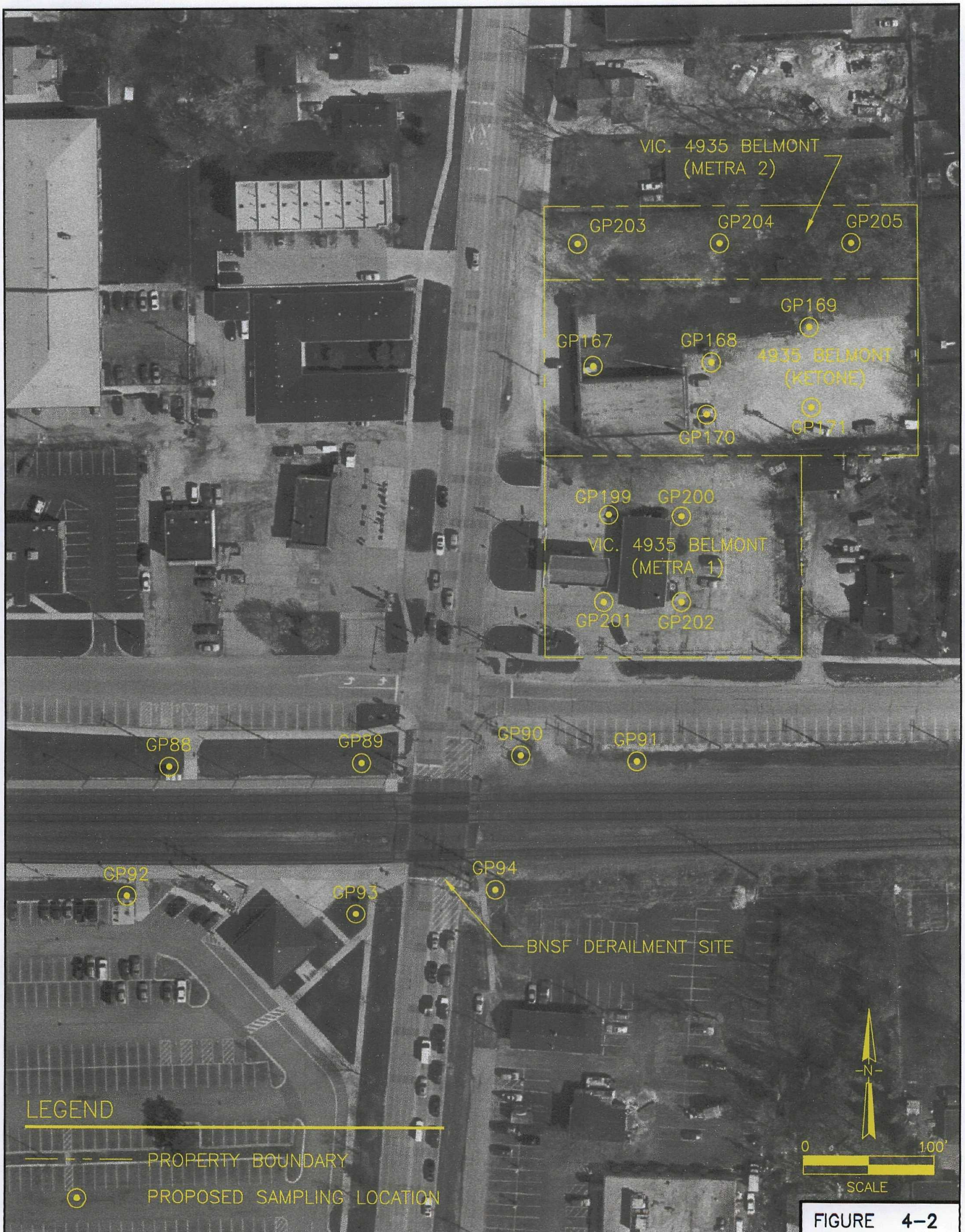

FIGURE 4-2

RESPONSE ACTION CONTRACT U.S. EPA CONTRACT No. 68-W7-0026 WORK ASSIGNMENT No. 155-RICO-B51W DOCUMENT CONTROL No. RFW155-2A-AOHC	BORING LOCATION MAP BNSF KETONE, METRA 1, METRA 2 PROPERTIES ELLSWORTH INDUSTRIAL PARK SITE Downers Grove, Illinois

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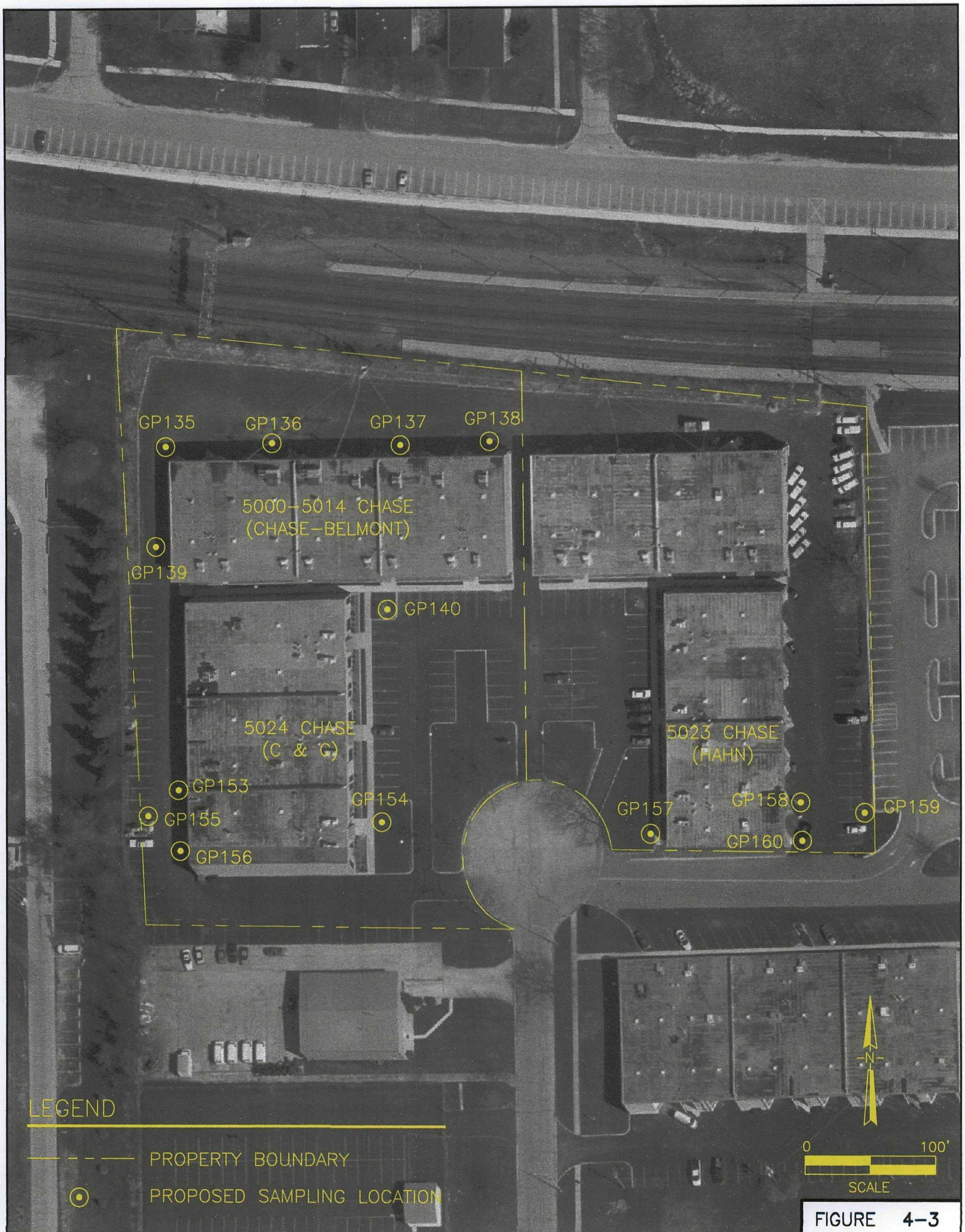

FIGURE 4-3

RESPONSE ACTION CONTRACT	BORING LOCATION MAP
U.S. EPA CONTRACT No. 68-W7-0026	CHASE-BELMONT, C & C, AND HAHN PROPERTIES
WORK ASSIGNMENT No. 155-RICO-B51W	ELLSWORTH INDUSTRIAL PARK SITE
DOCUMENT CONTROL No. RFW155-2A-AOHC	Downers Grove, Illinois

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FIGURE 4-4

RESPONSE ACTION CONTRACT
U.S. EPA CONTRACT No. 68-W7-0026
WORK ASSIGNMENT No. **155-RICO-B51W**
DOCUMENT CONTROL No. **RFW155-2A-AOHC**

BORING LOCATION MAP
MAPLE GROVE AUTO AND MAPLE PLAZA
CLEANERS PROPERTIES
ELLSWORTH INDUSTRIAL PARK SITE
Downers Grove, Illinois

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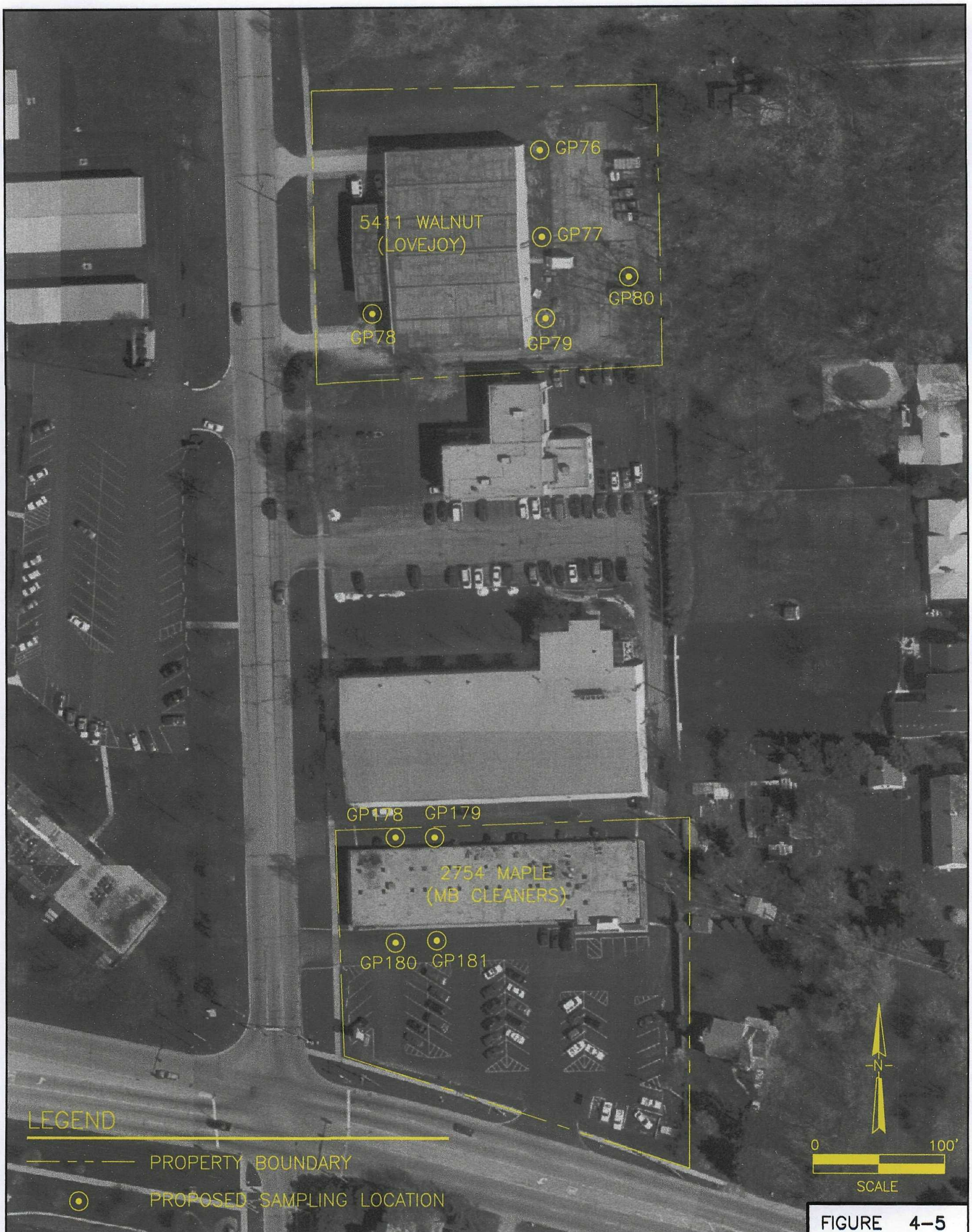

FIGURE 4-5

RESPONSE ACTION CONTRACT U.S. EPA CONTRACT No. 68-W7-0026 WORK ASSIGNMENT No. 155-RICO-B51W DOCUMENT CONTROL No. RFW155-2A-AOHC	BORING LOCATION MAP LOVEJOY AND MB CLEANERS PROPERTIES ELLSWORTH INDUSTRIAL PARK SITE Downers Grove, Illinois

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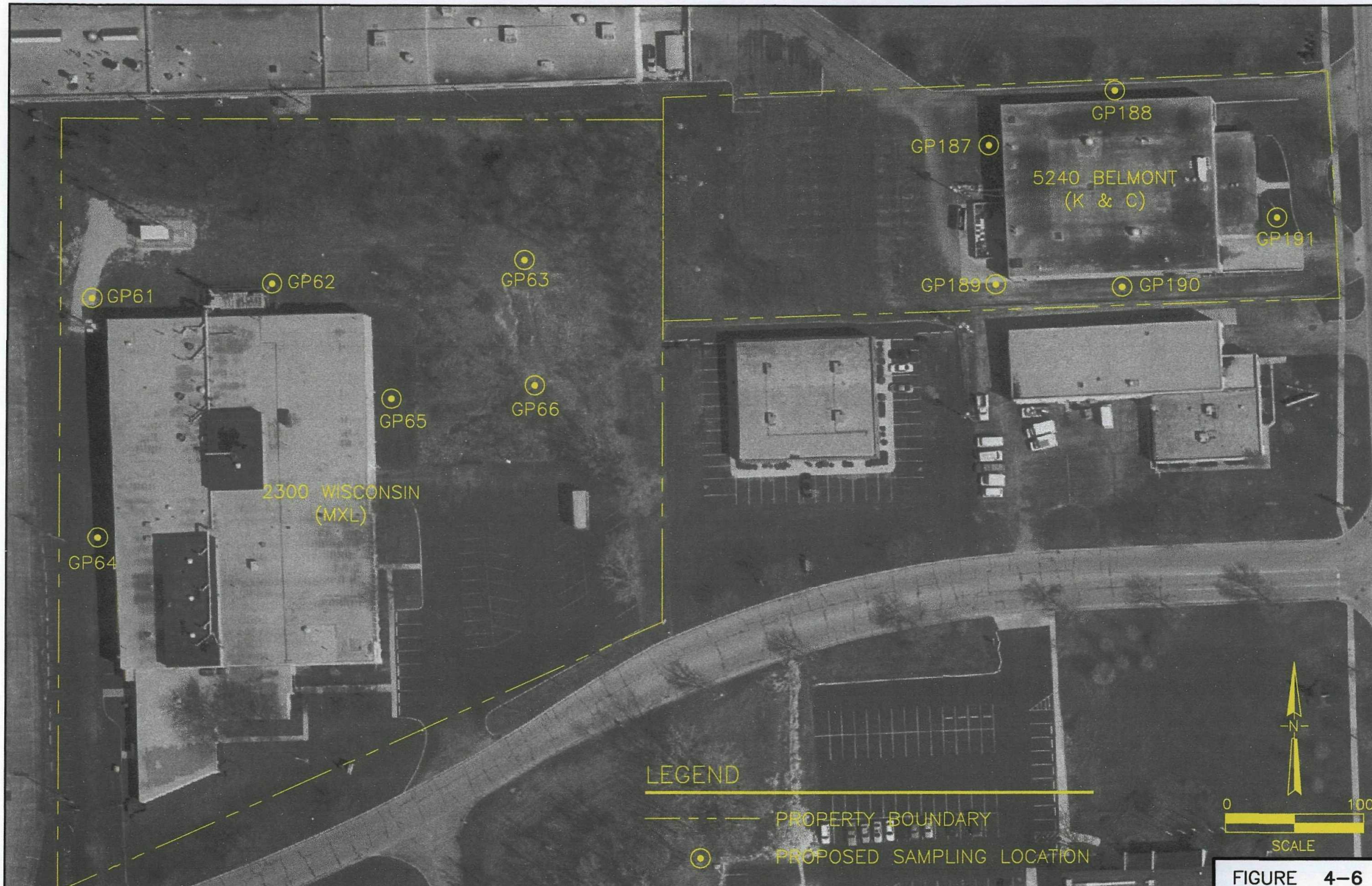

FIGURE 4-6

RESPONSE ACTION CONTRACT
U.S. EPA CONTRACT No. 68-W7-0026
WORK ASSIGNMENT No. 155-RICO-B51W
DOCUMENT CONTROL No. RFW155-2A-AOHC

BORING LOCATION MAP
MXL AND K & C PROPERTIES
ELLSWORTH INDUSTRIAL PARK SITE
Downers Grove, Illinois

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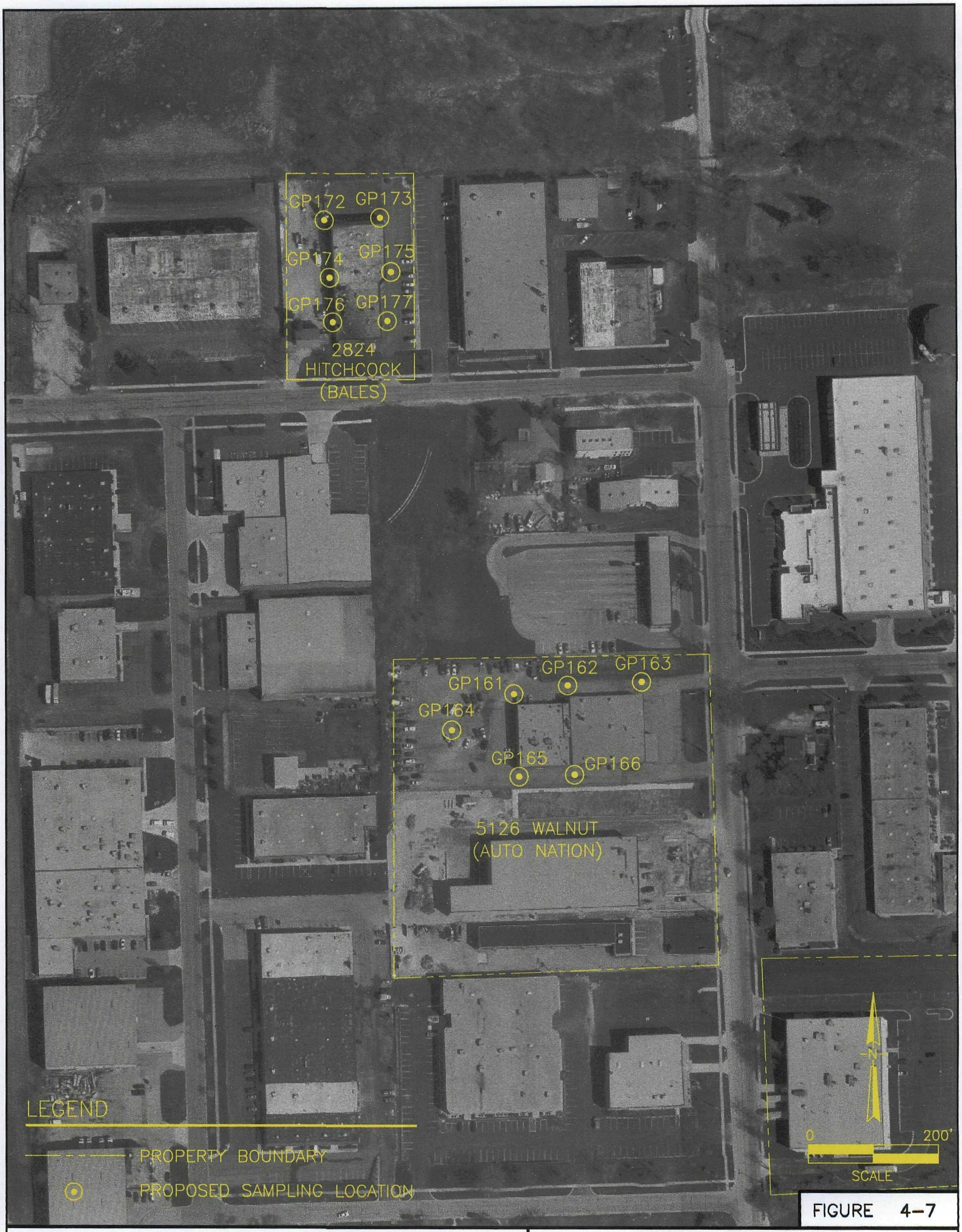

FIGURE 4-7

RESPONSE ACTION CONTRACT U.S. EPA CONTRACT No. 68-W7-0026 WORK ASSIGNMENT No. 155-RICO-B51W DOCUMENT CONTROL No. RFW155-2A-AOHC	BORING LOCATION MAP BALES AND AUTO NATION PROPERTIES ELLSWORTH INDUSTRIAL PARK SITE Downers Grove, Illinois

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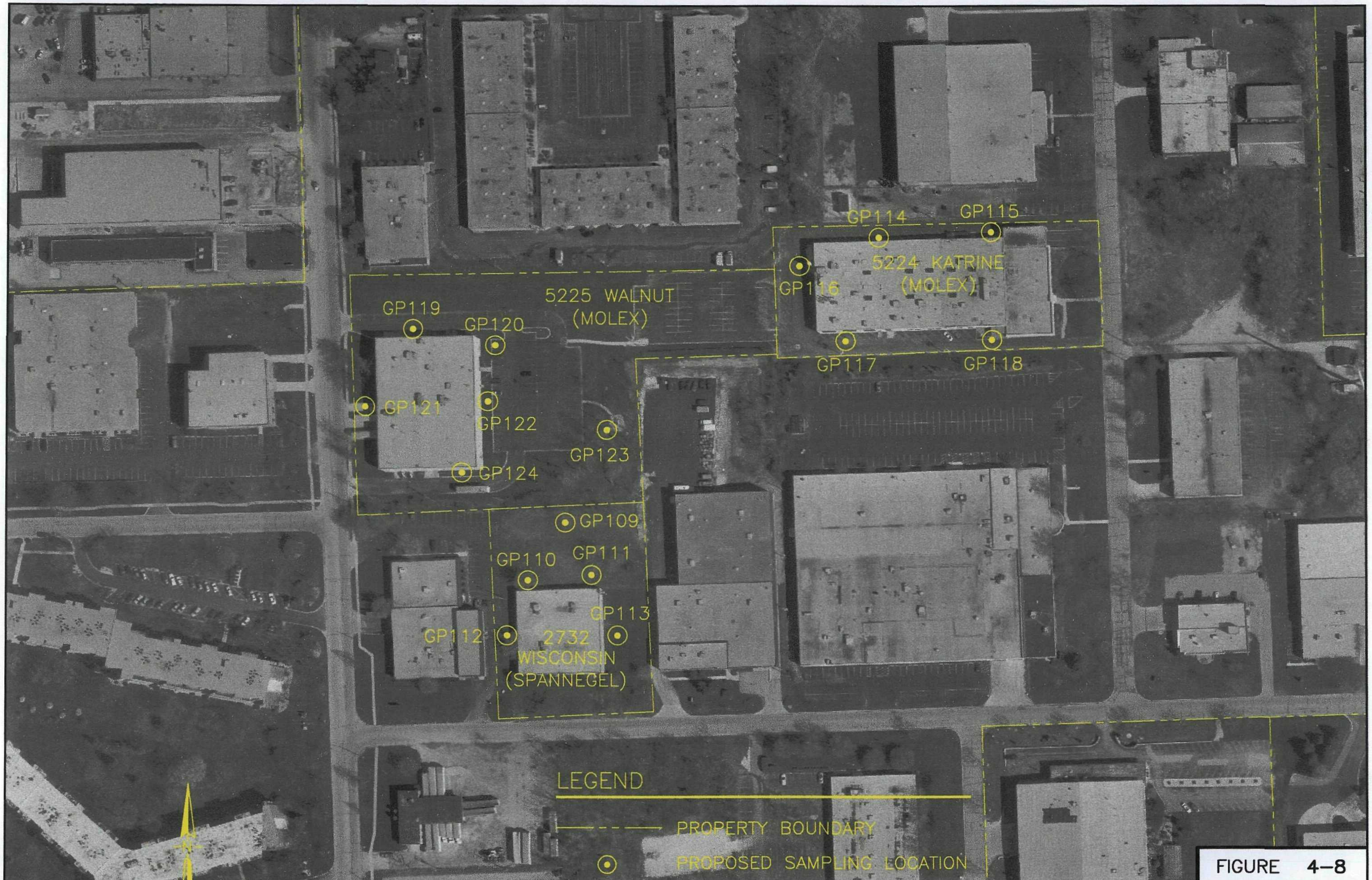

FIGURE 4-8

RESPONSE ACTION CONTRACT

U.S. EPA CONTRACT No. 68-W7-0026
WORK ASSIGNMENT No. **155-RICO-B51W**
DOCUMENT CONTROL No. **RFW155-2A-AOHC**

BORING LOCATION MAP
SPANNEGEL AND MOLEX PROPERTIES
ELLSWORTH INDUSTRIAL PARK SITE
Downers Grove, Illinois

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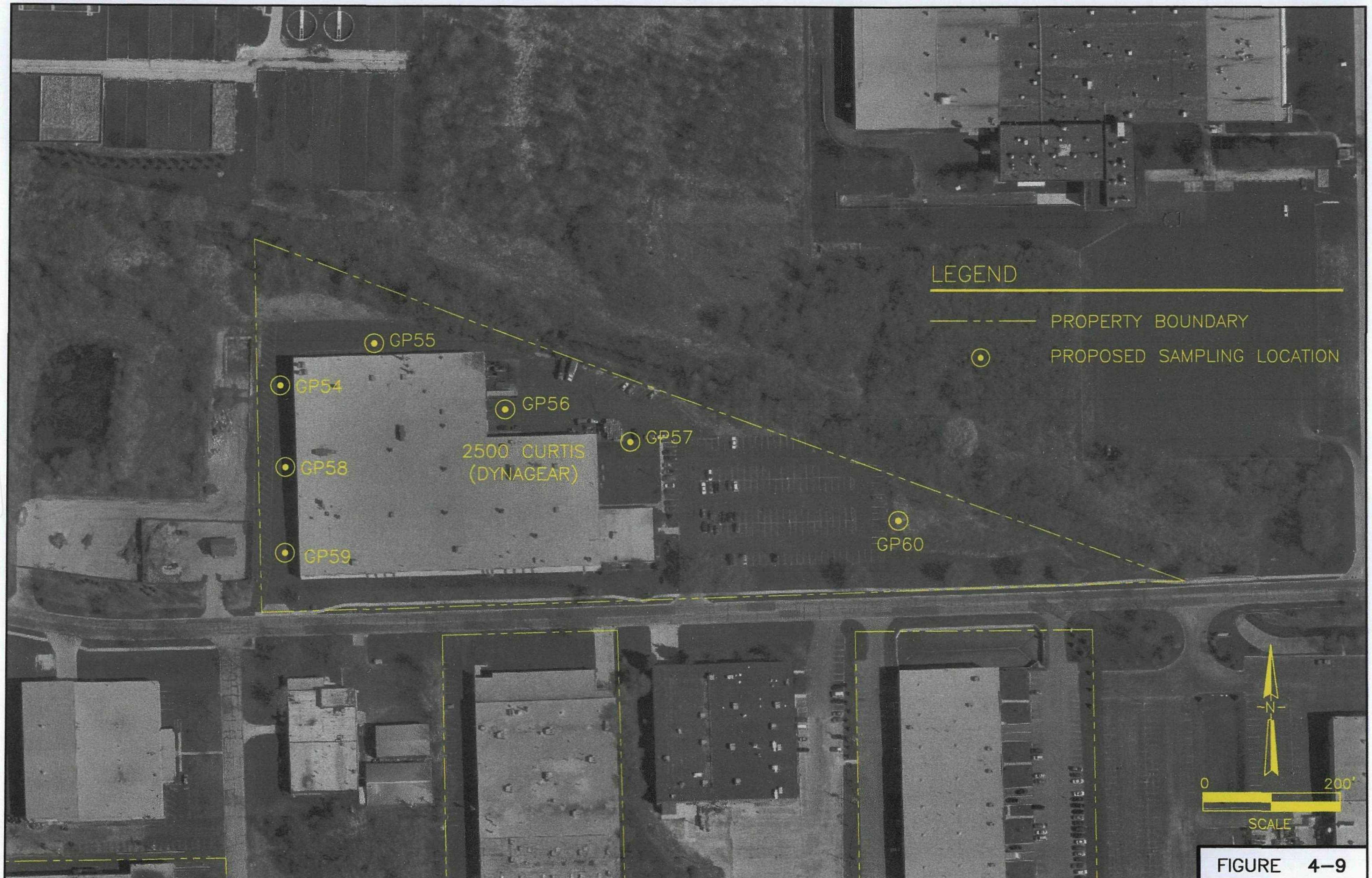

FIGURE 4-9

RESPONSE ACTION CONTRACT
U.S. EPA CONTRACT No. 68-W7-0026
WORK ASSIGNMENT No. 155-RICO-B51W
DOCUMENT CONTROL No. RFW155-2A-AOHC

BORING LOCATION MAP
DYNAGEAR PROPERTY
ELLSWORTH INDUSTRIAL PARK SITE
Downers Grove, Illinois

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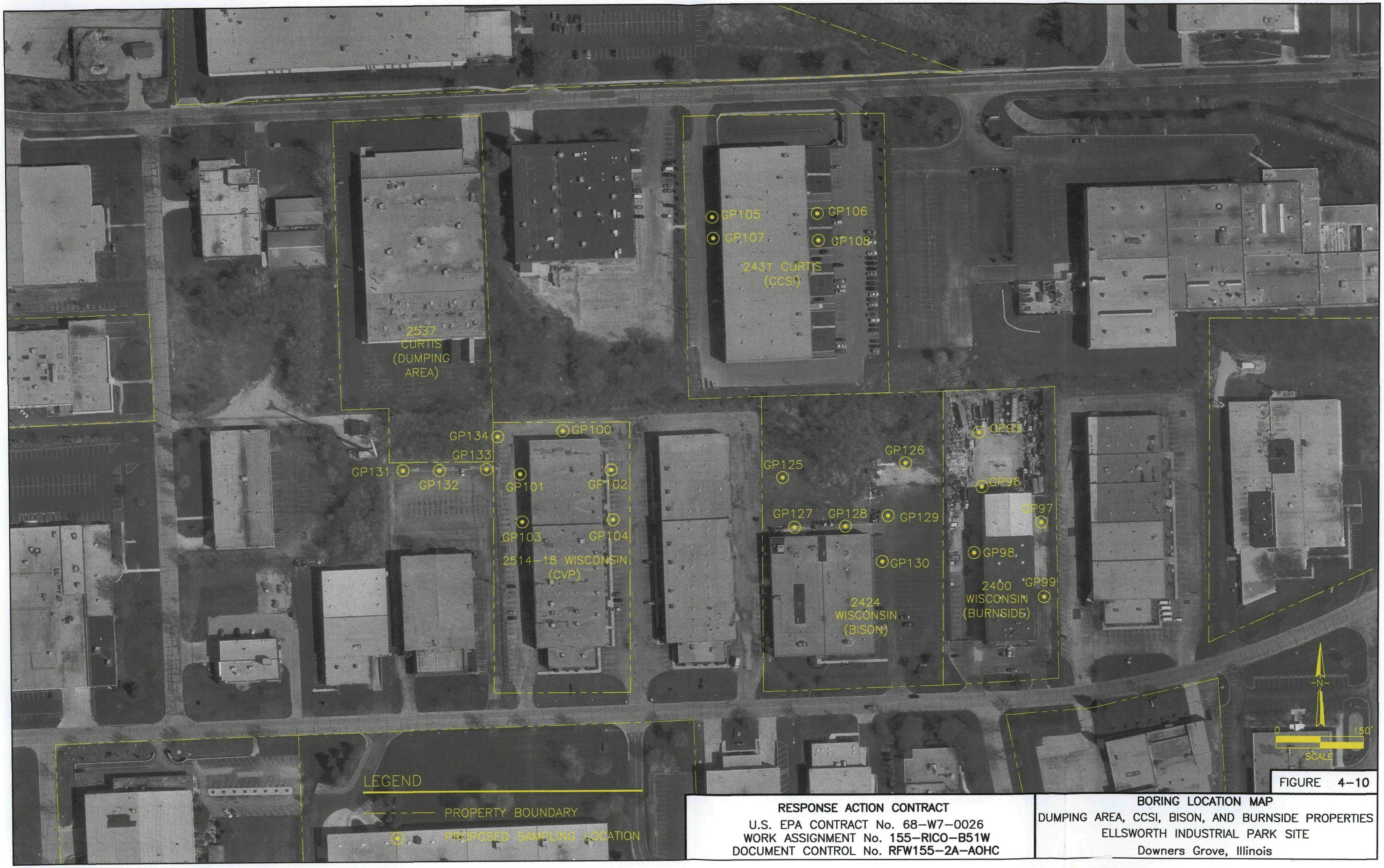

FIGURE 4–10

RESPONSE ACTION CONTRACT
U.S. EPA CONTRACT No. 68–W7–0026
WORK ASSIGNMENT No. 155–RICO–B51W
DOCUMENT CONTROL No. RFW155–2A–AOHC

BORING LOCATION MAP
DUMPING AREA, CCSI, BISON, AND BURNSIDE PROPERTIES
ELLSWORTH INDUSTRIAL PARK SITE
Downers Grove, Illinois

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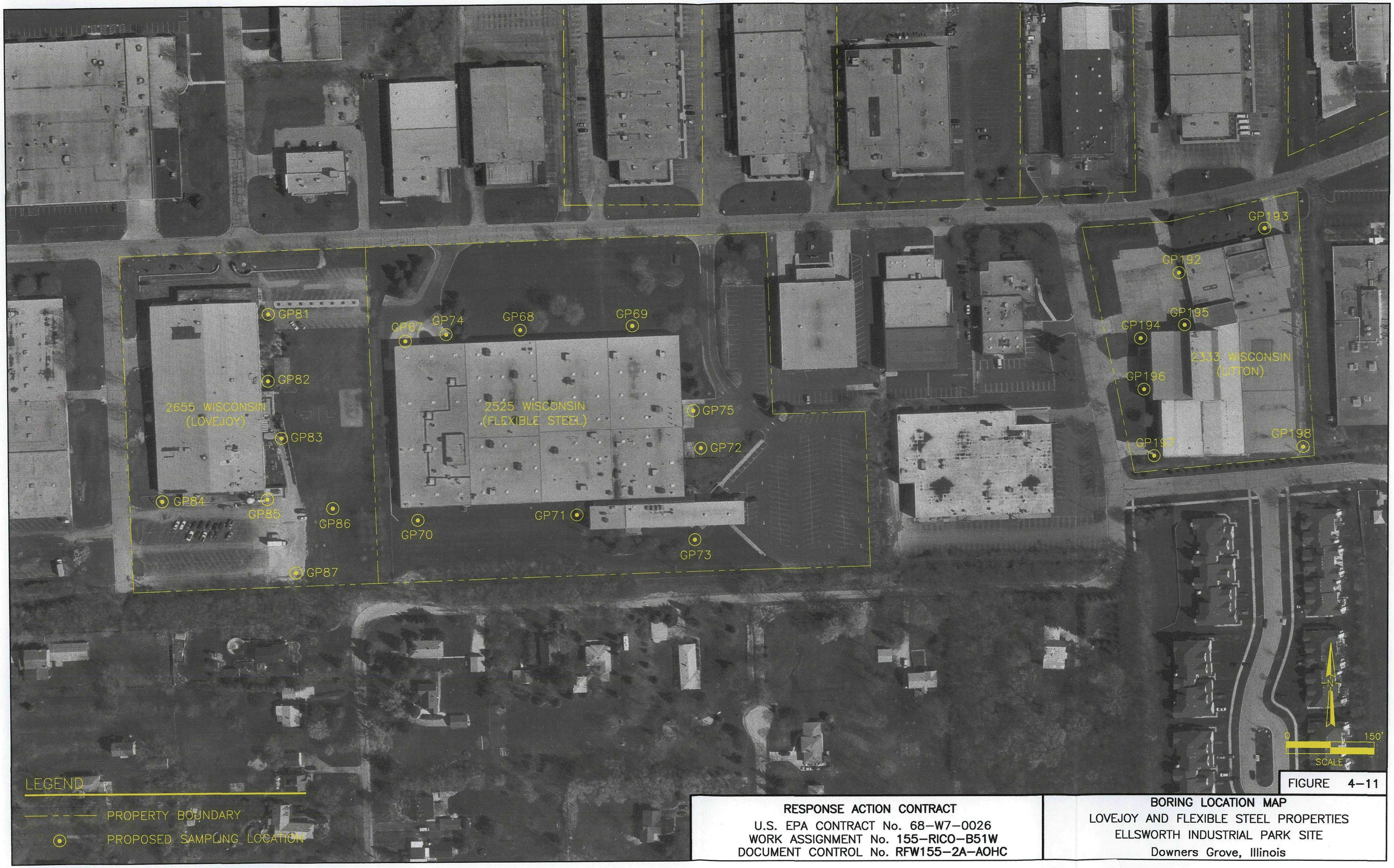

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Table 4-1

Proposed Sampling Plan and Rationale
Ellsworth Industrial Park Site
Downers Grove, Illinois

Site	Boring ID	Description/ Rationale of Location
Dynagear 2500 Curtis	GP54	West side of building, evaluate groundwater constituents detected in previous studies on west side of building adjacent to west property line.
	GP55	Random location , north side of building
	GP56	Northeast portion of building, loading dock area, storage area
	GP57	Northeast corner of building, loading docks, container storage area, possible staining noted 1995 aerial photography.
	GP58	West side of building, evaluate groundwater constituents detected in previous studies on west side of building adjacent to west property line.
	GP59	West side of building, evaluate groundwater constituents detected in previous studies on west side of building adjacent to west property line.
	GP60	East side of property, adjacent to retention basin shown in multiple aerial photographs
MXL 2300 Wisconsin	GP61	Northwest corner of building, outside storage area and drainage ditch noted in 1967 and 1975 aerial photography
	GP62	North side of building, possible stacked storage area noted 1990 aerial photography.
	GP63	Wooded outlot northeast portion of property in area of noted drainage ditch 1967and 1975 aerial photography
	GP64	Random location west side of building.
	GP65	East side of building, area where drainage ditches originate 1967 and 1975 aerial photography
	GP66	Wooded outlot northeast portion of property in area of noted drainage ditch 1967 and 1975 aerial photography
Flexible Steel 2525 Wisconsin	GP67	North side of building, loading dock area
	GP68	Random location, north side of building
	GP69	Random location, north side of building
	GP70	South side of building, manmade drainage channel noted along south side of building in 1978 aerial photo
	GP71	South side of building, ditch noted in area in 1967 aerial photo just to east, manmade drainage channel noted in 1978 aerial photo
	GP72	East side of building, refuse container storage area noted 1972 aerial photo
	GP73	South side of building, ditch noted in area in 1967 aerial photo
	GP74	North side of building, loading dock area
	GP75	East side of building, refuse container storage area noted 1972 aerial photo

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RFW155-2A-AOHC

Table 4-1

Proposed Sampling Plan and Rationale
Ellsworth Industrial Park
Downers Grove, Illinois

Site	Boring ID	Description/ Rationale of Location
Lovejoy 5411 Walnut	GP76	Northeast corner of building, outside storage area
	GP77	East central side of building, storage area
	GP78	West side of building adjacent to main overhead access doors
	GP79	Southeast corner of building, outside storage area
	GP80	Random location east side of building, outside storage area
Lovejoy 2655 Wisconsin	GP81	Northeast corner of building, ground scar noted in 1981 aerial photo
	GP82	East side of building, north of possible drum storage area 1972 and 1975 aerial photo
	GP83	East side of building, south of possible drum storage area and at beginning of drainage ditch noted in 1972 aerial photo
	GP84	Southwest corner of building
	GP85	Southeast corner of building, area of debris and soil staining noted in 1972 and 1975 aerial photograph. Horizontal and vertical tanks and soil staining noted in 1981 aerial photo.
	GP86	Open area southeast of building, staining, outside storage, and dark toned soil noted 1975 and 1978 aerial photographs
	GP87	Near south property line, just south of cleared area and soil stain area noted in 1972 and 1975 aerial photograph.
BNSF Derailment Site Belmont and Warren	GP88	Northwest of intersection Belmont and Burlington, access available open grassy area
	GP89	Northwest of intersection Belmont and Burlington, access available open grassy area
	GP90	Northeast of intersection Belmont and Warren, access available BNSF access road
	GP91	Northeast of intersection Belmont and Warren, access available BNSF access road
	GP92	Adjacent to station building southwest of intersection
	GP93	Adjacent to station building southwest of intersection
	GP94	Southeast of intersection Belmont and Warren, limited access area

Table 4-1

Proposed Sampling Plan and Rationale
Ellsworth Industrial Park
Downers Grove, Illinois

Site	Boring ID	Description/ Rationale of Location
Burnside 2400 Wisconsin	GP95	North side of building, drainage ditch noted 1975 aerial photo, debris noted 1978 aerial photo,
	GP96	North side of building, drainage ditch noted 1975 aerial photo,
	GP97	Random location, east side of building
	GP98	Random location, west side of building
	GP99	Random location,.east side of building
CVP 2514-18 Wisconsin	GP100	Random location, north side of building
	GP101	Random location, west side of building
	GP102	Random location, east side of building
	GP103	Random location, west side of building
	GP104	Random location, east side of building
CCSI 2431 Curtis	GP105	Random location, west side of building
	GP106	Random location, east side of building
	GP107	Random location, west side of building
	GP108	Random location, east side of building
Spannegel 2732 Wisconsin	GP109	Random location, norther portion of property, open area
	GP110	Northwest corner of building, dark toned soil, disturbed ground and faint ground scar noted 1978 aerial photography
	GP111	Random location, northeast corner of building
	GP112	Random location, west side of building
	GP113	Random location, east side of building

Table 4-1

Proposed Sampling Plan and Rationale
Ellsworth Industrial Park
Downers Grove, Illinois

Site	Boring ID	Description/ Rationale of Location
Molex 5224 Katrine	GP114	Random location, north side of building
	GP115	Random location, north side of building
	GP116	Northwest corner of building, location of vertical tank, unknown use.
	GP117	Random location, near southwest corner of building
	GP118	South side of building, outside storage area noted 1990 aerial photography
Molex 5225 Walnut	GP119	Random location, north side of building
	GP120	Random location northeast corner of building
	GP121	West side of building adjacent to loading docks
	GP122	Random location, east side of building.
	GP123	Open area east side of property, disturbed ground noted 1995 aerial photography
	GP124	Random location, near southeast corner of building.
Bison 2424 Wisconsin	GP125	Open area northwest portion of property, dart toned mounded material noted 1978 aerial photograph
	GP126	Open area northeast portion of property, drainage ditch noted 1978 and 1981 aerial photos,
	GP127	North side of building, outside storage area, dark toned soil, and probable staining noted 1978 aerial photo, outside storage along north wall of building noted in 1990 aerial photo
	GP128	North side of building, outside storage area, dark toned soil, and probable staining noted 1978 aerial photo, outside storage along north wall of building noted in 1990 aerial photo
	GP129	Northeast corner of building, drainage ditch noted 1978 aerial photo, outside storage along north wall of building noted in 1990 aerial photo
	GP130	Random location, east side of building.
Alleged Dumping Area 2537 Curtis	GP131	Back of parking lot Norwood property, along property line south of alleged dumping area
	GP132	Back of parking lot Norwood property, along property line south of alleged dumping area
	GP133	Back of parking lot Norwood property, along property line south of alleged dumping area
	GP134	Back of parking lot CVP property, along property line east of alleged dumping area

Table 4-1

Proposed Sampling Plan and Rationale
Ellsworth Industrial Park
Downers Grove, Illinois

Site	Boring ID	Description/ Rationale of Location
Chase-Belmont 5000-5014 Chase	GP135	Loading dock area north side of building
	GP136	Loading dock area north side of building
	GP137	Loading dock area north side of building
	GP138	Loading dock area north side of building
	GP139	Access entryway west side of building
	GP140	Random location south side of building, center area
Former WWTP South of Curtis and Glenview Streets	GP141	Location of former pond/lagoon in 1956 aerial photography
	GP142	Location of former structures/buildings/storage areas 1963 aerial photography
	GP143	Location of former structures/buildings/storage areas 1963 aerial photography
	GP144	Location of former structures/buildings/storage areas 1963 aerial photography
	GP145	Location of former pond/lagoon in 1956 aerial photography
	GP146	Location of former structures/buildings/storage areas 1963 aerial photography
	GP147	Former pond/lagoon outfall area
	GP148	Former pond/lagoon
Maple Plaza Cleaners 2265 Maple	GP149	Random location north side of building unit, front of business
	GP150	Random location south side of building unit
	GP151	Random location north side of building unit, front of business
	GP152	Random location south side of building unit
C & C 5024 Chase	GP153	Random location west side of unit, loading dock area
	GP154	Random location east side of building, nearest access front of building
	GP155	Storage/parking area west side of lot, west side of building, light toned material noted 2001 aerial photography
	GP156	Random location west side of unit, loading dock area

Table 4-1

Proposed Sampling Plan and Rationale
Ellsworth Industrial Park
Downers Grove, Illinois

Site	Boring ID	Description/ Rationale of Location
Hahn 5023 Chase	GP157	Random location east side of building, nearest access front of building
	GP158	Randon location east side of unit
	GP159	Outside storage area, dark toned material, possible soil staining 1978 aerial photography.
	GP160	Loading dock east side of unit.
Auto Nation 5126 Walnut	GP161	Northwest corner of building
	GP162	North side of building, central portion
	GP163	Northeast corner of building
	GP164	Random location, outside storage lot
	GP165	Southwest corner of building
	GP166	South side of building, central portion
Ketone 4935 Belmont	GP167	Storage area north side of main building
	GP168	Storage /parking area east side of main building
	GP169	Random location east side of property in parking lot/storage area
	GP170	Storage /parking area east side of main building
	GP171	Random location east side of property in parking lot/storage area
Bales 2824 Hitchcock	GP172	Northwest corner of building, outside storage area with crates, debris, and dark toned objects noted in 2001 aerial photography
	GP173	Northeast corner of building
	GP174	West side of building, dark stained soil noted 2001 aerial photography
	GP175	East side of building
	GP176	Southwest corner of building
	GP177	Southeast corner of building

Table 4-1

Proposed Sampling Plan and Rationale
Ellsworth Industrial Park
Downers Grove, Illinois

Site	Boring ID	Description/ Rationale of Location
MB Cleaners 2754 Maple	GP178	Random location north side of building unit
	GP179	Random location north side of building unit
	GP180	Random location south side of building unit, front of business
	GP181	Random location south side of building unit, front of business
Maple Grove Autotomotive 2315 Maple	GP182	West side of main building in front of large overhead access doors
	GP183	Southwest corner of building
	GP184	Random location, auto/equipment storage area.
	GP185	Southeast corner of building, outside storage area.
	GP186	Random location, auto/equipment storage area.
K & C 5240 Belmont	GP187	Northwest corner of building, north of existing storage area
	GP188	Random location in driveway, north side of building
	GP189	West side of building adjacent to existing storage, possible staining noted 1975 aerial photography
	GP190	Random location in driveway, south side of building
	GP191	Random location east side (front) of building.
Litton 2333 Wisconsin	GP192	Northwest corner of building
	GP193	Random location, northeast corner of building
	GP194	West central side of building, dark toned material and disturbed ground noted 1978 and subsequent aerial photographs
	GP195	West central side of building, dark toned material and disturbed ground noted 1978 and subsequent aerial photographs
	GP196	West side of building, disturbed ground noted 1963 aerial photo under adjacent structure, outside storage with possible drums and tanks noted in 1978 and 1981 aerial photos
	GP197	Southwest corner of building, dark toned soil noted 1967 and 1975 aerial photo under adjacent structure
	GP198	Southeast corner of building, drainage ditch noted along south side of building in multiple aerial photos.

Table 4-1

Proposed Sampling Plan and Rationale
Ellsworth Industrial Park
Downers Grove, Illinois

Site	Boring ID	Description/ Rationale of Location
Metra 1 Vic. 4935 Belmont	GP199	Northwest corner of former structure
	GP200	Northeast corner of former structure
	GP201	Southwest corner of former structure
	GP202	Southeast corner of former structure
Metra 2 Vic. 4935 Belmont	GP203	Random location west side of property
	GP204	Random location center of property
	GP205	Random location east side of property

Table 4-2

Summary of Groundwater and Soil Sampling and Analysis Program
Ellsworth Industrial Park
Downers Grove, Illinois

Sample Matrix	Field Parameters	Laboratory Parameters	Investigative			Field Duplicate			Field Blank			MS/MSD[1]			Matrix Total*
			No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	
Groundwater-Direct push technology	Conductivity, Temperature, and pH	CLP RAS Volatile Organic(OLC) Compounds	190	1	190	19	1	19	19	1	19	10	1	10	228
Soil- Direct push technology	Conductivity, Temperature, and pH	CLP RAS Volatile Organic Compounds (OLM)	380	1	380	38	1	38	NA	NA	NA	19	1	19	418

[1]MS/MSDs are not additional samples, but are instead investigative samples on which MS/MSD analyses are performed. MS/MSDs are for organic samples only.

*The matrix total does not include trip blank samples and MSMDs samples. One trip blank will be shipped with every shipment container of aqueous VOA samples.

Table 4-3

Sample Container, Volume, and Preservation Requirements
Ellsworth Industrial Park Site
Downers Grove, Illinois

Matrix Type	Analysis	Sample Concentration Level	No. of Bottles	Type of Bottles	Preservatives	Technical Holding Time*
Groundwater -Direct Push Technology	Volatiles	Low	2	40-mL glass vials	Cool, 4°C 4 drops 1:1 HCl to pH <2	14 days
Soil- Direct Push Technology	Volatiles	Low	3	Encore samplers per sample (5 gram each)	Cool, 4°C, lab to preserve.	48 hours for preservation. 14 days analysis
	Moisture content	NA	1	2-ounce glass jar		

* All holding times are from the date of sample collection.

Note: Aqueous MS/MSD samples will require triple the normal volume forvolatile organics. Soil MS/MSD will require 2 additional Encores. One trip blank will accompany each aqueous VOA shipment container. Trip blanks accompanying water samples will be collected in two 40-mL glass vials. No trip blank will be sent for soil samples. Additional soil volume will be collected and sent for percent moisture.

Table 4-4

Standard Decontamination Protocol for Sampling Equipment
Ellsworth Industrial Park
Downers Grove, Illinois

Step	Procedure
1	Scrub equipment thoroughly with soft-bristle brushes in a phosphate-free, low-sudsing detergent solution.
2	Rinse equipment with tap water by submerging and/or spraying. (See note below.)
3	Rinse equipment with reagent-grade distilled/deionized water until dripping and allow to air dry for 1 to 2 minutes.
4	Rinse equipment a second time with deionized water by spraying until dripping.
5	Place equipment on polypropylene or aluminum foil and allow to air-dry for 5 to 10 minutes.
6	Wrap equipment in polypropylene or aluminum foil for handling and/or storage until next use.

Note: The decontamination liquids will be managed as described in Section 4.9. If sampling equipment was used to collect oily or adhesive types of contaminated media, or the presence of organic compound residue is suspected, a rinse via spraying with isopropanol will be included after Step 2.

Table 4-5

Standard Decontamination Protocol for Drilling Equipment
Ellsworth Industrial Park
Downers Grove, Illinois

Step	Procedure
1	Move the drilling rig or other equipment/materials to the designated decontamination area at the site.
2	Scrub equipment thoroughly with soft-bristle brushes in a phosphate-free, low-sudsing detergent solution.
3	Pressure wash both inside and outside of the probes and rods (See note below) and any pertinent portion of the rig.
4	Place all decontaminated well materials (e.g., well casing, well screen) on clean polypropylene sheeting until use.

Notes:

Pressure washing will continue until all solid material and/or visible contamination is removed.

The decontamination liquid will be managed as described in Section 4.9.

SECTION 5

DATA MANAGEMENT PLAN

5.1 DATA MANAGEMENT OBJECTIVE

This Data Management Plan (DMP) has been prepared as part of the Phase I RI/FS for the Ellsworth Industrial Park site. The objective of this DMP is to establish procedures for documenting and presenting the data generated during the Phase I RI/FS. Data generated during the Phase I RI/FS for the Ellsworth Industrial Park site will be used to support and guide current and future field activities.

Efficient and comprehensive consideration of all available data requires that these data be properly organized. Organization of the data must be planned prior to actual collection to ensure the generation of appropriate and usable data. The DMP will be implemented during all phases of the Ellsworth Industrial Park RI/FS and may be modified during implementation of subsequent RI phases as need arises.

The objective of this plan is to provide details with respect to the following:

- Documentation and Tracking of Investigation Data
- Sample Identification Codes
- Data Documentation Materials and Procedures
- Data Management Team Responsibilities

5.2 DATA DOCUMENTATION

All samples for analysis, including QC samples, will be given a unique sample number. The sample numbers will be recorded in the field logbook and on the chain-of-custody forms.

WESTON will assign each sample a project sample number. The project sample number highlights the sample matrix and location, and will be used for documentation purposes in field logbooks, as well as for presentation of the analytical data in WESTON memoranda and reports.

5.2.1 Sample Identification Codes

The WESTON project sample numbering system will be composed of the following components:

Project Identifier

The first part of the project sample number will consist of a three-character designation. This three-character code will be used to identify the Ellsworth Industrial Park site and the phase of the field investigation. EIP corresponds to Ellsworth Industrial Park site field investigation.

Sample Type and Sample Location

This shall consist of the following:

- A two-character sample type code. For the proposed types of field sampling, the following codes may be utilized during this phase or subsequent investigation phases, as applicable:

  GP - Geoprobe soil boring subsurface soil sample
  GPW - Geoprobe grab groundwater sample
  TW - Temporary well groundwater sample
  MW - Monitoring well groundwater sample
  RW - Residential well sample
  PW - Municipal water supply well sample
  SS - Surface soil (0 to 24 inches)
  SW - Surface water sample
  SD -Sediment
  DS - Drum sample solid
  DL - Drum sample liquid
  LS - Lagoon sediment

- A sample location code. The above sample type code will be combined with sample location identification (e.g, GP02 for Geoprobe soil boring "GP02," MW02 for monitoring well "MW02"). For field blanks and trip blanks, the two-character sample type code will be combined with FB for field blanks and TB for trip blanks (e.g, MWTB for a monitoring well trip blank).

Sequence Identifier

This shall consist of the following:

- A two-digit sequence number that tracks the number of samples collected from a specific location. Sequence 01 refers to the first sample interval, and sequence 02 refers to the second sample interval. Sample depths will not be a part of the sample code; rather, depth information will be recorded in the site field logbook and presented with the analytical results.

- If the sample is a field duplicate sample, the above will be combined with DP. If the sample is a matrix spike/matrix spike duplicate sample, the above will be combined with MSD.

- For field and trip blanks, the two-digit sequence number will denote the sequential number of field or trip blank sample collected for that sample type.

- Field duplicate samples will be submitted without reference to the laboratory (i.e., the laboratory will not be informed that the sample is duplicate).

Some examples of the WESTON project sample numbering system are as follows:

1. EIP-GP02-01DP: Ellsworth Industrial Park site; Geoprobe soil boring location 2; duplicate of first soil sample collected at this location.

2. EIP-GPW03-01: Ellsworth Industrial Park site; Geoprobe grab groundwater sample 3; first groundwater sample at this location.

3. EIP-SWTB-01: Ellsworth Industrial Park site; surface water sampling, first trip blank sample.

4. EIP-MWFB-03: Ellsworth Industrial Park site; monitoring well water sampling, third field blank sample.

5. EIP-MW01-01MSD: Ellsworth Industrial Park site; monitoring well location 1; first sample collected at this location; sample is a matrix spike/matrix spike duplicate sample.

5.2.2 Field Data

Field Log Book

Field observations and other information pertinent to the collection of samples will be recorded in the field. All entries will be made in a bound logbook in ink. The entries will be detailed and descriptive so that a particular situation can be recalled without reliance on the collector's memory. Log books will be identified by unique sequential numbers. The data to be recorded for each sample will include date, time (24-hour military time reference), sample number, sample location, sample appearance, and name of the persons collecting the sample. In addition, general information will be recorded in the logbook daily, including personnel present at the site, level of protection being worn, and weather. Photographs will also be taken and logged to document sampling activities.

Geologic/Drilling Log

Drilling information will be recorded into the field log book, field data collection forms, or digital/electronic device and transferred to a geologic drill log. A separate log will be maintained for each boring. Instrument readings from the organic vapor meter (OVM), organic vapor analyzer (OVA), and/or combustible gas indicator (CGI) used for health and safety monitor will be recorded in the notes column of the log. Upon completion of the field work, the drill log information may be entered into a computer database as appropriate.

Field Measurement Data

Measurements of field parameters will be recorded in the field log book, field data collection forms, or digital device, including (as appropriate):

- Date, time and individual performing the measurements
- Sample location
- Weather conditions
- Parameter to be measured
- Model number of instrument used
- Calibration performed, including readings from calibration checks performed
- Reading

The units to be used for water quality parameters will include the following and/or others, as appropriate:

- pH units to the tenths decimal place
- Water level in feet to the one-hundredths decimal place
- Temperature in degrees Celsius, to the tenth of a degree
- Conductivity in μmhos to the tenths place

Sample Collection Information

Samples collected will be recorded in the field log book, field data collection forms, or digital device with the following information, as appropriate:

- Sample location
- Depth of sample collection
- Sample matrix
- Sample identification number
- Date and time of collection
- Any unusual appearances of the sample
- Parameters to be analyzed
- Date and time sample was released or received

Chain-of-Custody Record/ Sample Tracking

U.S. EPA's registered FORMS II Lite program will be used to document samples shipped to U.S. EPA or U.S. EPA designated CLP laboratories. U.S. EPA OERR's Analytical Operations/Data Quality Center (AOC) developed the Field Operations and Records Management System (FORMS) II Lite to generate sample labels and Traffic Reports and Chain of Custody (COC) forms. The system also tracks samples from the field to the laboratory and facilitates electronic capture of sample information into databases as well as exports data electronically as .xml, .dbf, or .txt files.

Specifically, FORMS II Lite does the following:

- Generates and prints sample documentation (e.g., Traffic Report/Chain-of-Custody Record (TR/COC), bottle labels, and sample tag labels) in the field;
- Provides a legible document for each of the recipients of the TR/COC;
- Eliminates manual transcription errors associated with the completion of sample documentation through the "enter once, use many" philosophy;
- Facilitates the electronic capture of sample information into Laboratory Information Management Systems (LIMS) to automate the sample login process.

FORMS II Lite will be used to provide a COC record for each sample as it is collected by the field sampler to maintain a record of sample collection, transfer between personnel, shipment, and receipt by the laboratory.

5.2.3 Laboratory Data

5.2.3.1 Analytical Laboratories

Samples will be analyzed by various laboratories in U.S. EPA's CLP, as assigned through U.S. EPA's Regional Sample Control Coordinator (RSCC).

5.2.3.2 Analytical Reports

Analytical reports comprise final results (uncorrected for blanks and recoveries, unless specified), methods of analysis, levels of reporting, laboratory QC data, and supporting instrument data. In addition, special analytical problems will be noted in the case narratives. The number of significant figures reported will be consistent with the limits of uncertainty inherent in the analytical method. Consequently, most analytical results will be reported to no more than two or three significant figures. Data are normally reported in units commonly used for the analyses performed.

Concentrations in liquids are expressed in terms of weight or activity per unit volume (e.g., micrograms per liter [ug/L], or milligrams per liter [mg/L]). Concentrations in solid or semisolid matrices are expressed in terms of weight or activity per unit weight of sample (e.g., micrograms per kilogram [ug/kg], or milligrams per kilogram [mg/kg]). Solid and semisolid matrices will also be reported on a dry weight basis. Reporting limits take into account all appropriate concentration, dilution, and/or extraction factors.

If any analytical anomalies were encountered during the analyses (e.g., a matrix duplicate that significantly deviates from expected analytical control points), they will be documented in a case narrative, and copies of the Sample Discrepancy Reports (SDRs) or Corrective Action Reports (CARs) must be included in the data packages.

The laboratory will report all analytical results using full CLP documentation reports to satisfy data validation requirements. Data will be reported by sample delivery group (SDG) or chain-of-custody number (i.e., in the same batches as received at the laboratory).

5.2.3.3 EDD Specification

The electronic data deliverable (EDD) will be delivered as either a flat ASCII file with tab delimiters, a flat ASCII file with fixed width columns, or a Microsoft Excel file. The ASCII or Excel file must have columns present in the order shown in the EDD Specification Table in Appendix C. Character data must not exceed the record sizes indicated and all field names must contain correct information. Non-highlighted field names may have empty content. The details for the EDD are presented in Appendix C.

5.2.3.4 EQuIS Database

WESTON has committed to standardizing its approach to data management by utilizing Environmental Quality Information Systems (EquIS) Software. EQuIS is an environmental data management program developed by EarthSoft, Inc., Geotech) of Pensacola, Florida. WESTON employs a solution-oriented approach to data management, which emphasizes innovative applications that significantly expedite data deliverables, increase project efficiency, and promote client satisfaction.

A consistent methodology to store and integrate related environmental information is critical for a successful site characterization/remediation. Client/server architecture is a proven means to store data in a centralized database location and to establish data "links" on a common field (e.g., location identifiers) through relational database technology. Centralized data storage with distributed access ensures, whenever possible, data integrity and provides a common source for all appropriate data analysis, reduction, and concise reporting.

The technical data management model for the project consists of an EquIS Database (Microsoft Access files) that is the repository for environmental sample and analytical data collected as part of the facility remediation process. Other interim database(s) may be used to manage related information.

5.2.4 Graphical Data

Data integration, manipulation, analysis, and visualization will be achieved through the use of multiple graphical data software packages. These software packages may include the following, as appropriate: AutoCad, Surfer, earthVision, gINT, WinLoG, and ArcView.

5.2.5 Historical Data

Some historical data may need to be entered into the central database. This will occur as data are needed, and typical sources will be laboratory reports, investigation reports, and electronic files. Any necessary historical data will be assessed for data quality and an audit trail will be maintained with respect to the original source of these data.

5.2.6 Document Management

Storage and Backup

Electronic project data will be stored on a secure system within the WESTON file servers. A secure system is defined as a computer system on which reasonable precautions, such as password required access, have been implemented to control access to the project data. WESTON servers are maintained on a network and conform to WESTON corporate procedures for daily, weekly, and monthly backups. After the completion of the project, a backup of the final data will be retained.

Reasonable precautions will be taken to provide electronic files that are free of computer viruses. Reasonable precautions include using commercial anti-virus software and current virus definitions. Virus definitions are updated on the same day that they are available from the vendor.

5.3 DATA PROCEDURES

5.3.1 Project Data Flow

The data life cycle begins with technical data requirements, followed by project planning, data collection and loading, data management, and data presentation. During the project-planning phase, the intended purpose for the data, including the identification of performance specifications for the data type, is defined. After appropriate communication of requirements to data collection teams and laboratories, actual sampling occurs in the data collection and loading phases and the data life cycle begins. Captured data are evaluated against pre-established performance specifications to determine the value or relevance to the original objectives. Data are retained for integration and storage in the EQuIS (central databases) database during the integration phase. Following data collection, users can access the EQuIS database to acquire results and conduct data reduction/analyses. Resulting data can be represented in tables and on maps during the presentation phase. A detailed discussion of each of these project phases is presented in the following subsections.

5.3.2 Field Data Entry

Field Data

Observations and measurements made in the field are recorded in the field log book, field data collection forms, and/or on electronic devices such as a laptop, tablet, or PDA. Upon completion of the field investigation, the data will be tabulated for analyses and presentation in the report. Copies of the original data records will be appended to the FS report as appropriate. Presentation copies summarizing the boring logs and monitor well installations will also be included in the FS report.

Data Collection and Loading

The raw data received from the field and analytical laboratory can be voluminous and unorganized. It is imperative that standards and protocols in the area of data collection are established to facilitate data organization and user access to the data. WESTON uses EQuIS data management software that embodies the following major components addressing data capture:

- Standardized data collection requirements to ensure the efficient and comprehensive capture of all relevant data.

- Standardized transfer and evaluation protocols to avoid the introduction of transcription errors to verify and validate information against performance requirements and to establish data of known quality prior to storage.

Where possible, data collection occurs on standardized field data collection forms. Form-based data, including chain-of-custody information, are transmitted or captured directly by the data management team, which is responsible for committing the information to the EQuIS database. Data passed from the field are integrated with other consultant/contractor-supplied data (e.g., historical data or results from the analytical laboratories) after the data pass through a verification process. This data verification step occurs prior to the commitment of results to the EQuIS database(s).

There may be some communication and reconciliation activities with the laboratories or other data providers to ensure that the desired data quality levels have been attained. After qualified results are committed to the EQuIS database(s), they are available for access by all authorized users.

5.3.3 Data Processing

5.3.3.1 Electronic Data Deliverable (EDD)

The laboratory will deliver data in the format as described in Appendix C. The processing steps of the EDD are as follows, as appropriate:

- Receive EDD via Email attachment, Internet upload, or compact disk from the laboratory
- Import the EDD into EQuIS Database
- Run general summary queries to check sample information (e.g., sample IDs, collection dates) and method information

- Review the COC and the laboratory data report and determine EDD (and sometimes laboratory report) data corrective actions

- Communicate data errors to the laboratory project manager and receive a corrected EDD and/or laboratory report. If corrections are minor, WESTON data management personnel will implement corrections.

- Commit the EDD data to the EQuIS central database

5.3.4 Data (EDD) Verification

The EDD must pass a number of data checks before being committed to the EQuIS database. Analytical data completeness and integrity are examined so that the final data set is of known quality. Verification items include the following, as appropriate:

- Analyte names and Chemical Abstract Service (CAS) numbers in the EDD are verified against the central database chemical look-up table.

- The EDD methods are compared to the COC.

- Data that must match valid values, such as laboratory qualifiers, are checked.

- Data types, such as numeric fields containing numeric results only and not letters or characters, are checked.

- The units in the EDD are compared to the analyte file to ensure consistency in reporting units.

- For each method in the EDD, the analytes are compared to the required analyte lists in the QAPP.

- Field sample identification codes, collection dates, and method names are checked for accuracy against the COC.

- The sample reporting levels are compared to the QAPP reporting levels.
- Re-analyses and dilutions are identified.

5.3.5 Data Validation

Data validation will be performed by U.S. EPA Region V on all data. The data will have been validated prior to receipt by WESTON. The resulting data validation qualifiers will be provided electronically in the EDD provided to WESTON and incorporated into the EQuIS database. WESTON will perform a compliance check on all data.

5.3.6 Data Delivery

Data and reports can be delivered in paper and electronic format on compact disks (CDs), e-mail, and/or the Internet, as appropriate.

5.4 DATA MANAGEMENT TEAM ROLES AND RESPONSIBILITIES

Within the overall project organization, the data management team will address information management requirements. Data operations covers sample analysis and tracking, laboratory oversight, data entry, data verification, data validation, and data reporting.

Data Operations is staffed by computer and scientific professionals (e.g., chemists, geotechnical scientists) who are responsible for supporting and maintaining the databases and data reports. The group manages the database, data entry, data flow, and data reporting.

SECTION 6

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APPENDIX A

STANDARD OPERATING PROCEDURE
FIELD Ph, CONDUCTIVITY, AND TEMPERATURE MEASUREMENTS

STANDARD OPERATING PROCEDURE

FIELD pH, CONDUCTIVITY, AND TEMPERATURE MEASUREMENT

1.0 INTRODUCTION

The purpose of this Standard Operating Procedure (SOP) is to provide Weston Solutions, Inc. (WESTON®) field personnel with a step-by-step guide to measure pH, conductivity, and temperature with a conductance, temperature and pH testing instrument.

2.0 CALIBRATION INSTRUCTIONS

Prior to instrumentation use, it is important to calibrate the instrument to check its accuracy. Since the temperature is pre-set at the factory, only the pH and conductivity need to be recalibrated.

1. Conductivity probe may be calibrated placing a clean probe into a cup of clean conductivity calibration solution.

2. Confirm that the calibration value entered matches the values indicated on the calibration solution bottle.

3. Wait until the conductivity reading stabilizes and press "enter" to accept calibration.

4. Similarly, calibrate pH. Minimum of two-point calibration should be used to ensure accurate pH readings.

3.0 OPERATING INSTRUCTIONS

1. Fill the clean sample cup at least 2/3 full.

2. Collect readings for pH, temperature and conductivity. If the reading is not stable, empty and refill the cup several times to bring the cup and the sample to the same temperature.

4.0 MAINTENANCE

If the instrument is battery-operated, the field personnel will check for the battery life at the beginning of the day and/or at the time of calibration. Battery will be replaced as necessary. If the instrument is operated by rechargeable battery, battery will be recharged every night.

APPENDIX B

STANDARD OPERATING PROCEDURE
WATER LEVEL MEASUREMENT

STANDARD OPERATING PROCEDURES

WATER LEVEL MEASUREMENTS

1.0 PURPOSE

Weston Solutions, Inc. (WESTON) has adopted the American Society for Testing and Materials (ASTM) Standard Method D4750-87 as its standard operating procedure for *Determining Subsurface Liquid Levels in a Borehole or Monitoring Well (ASTM, 1992)*.

2.0 INTERPRETATION

If there are questions regarding the interpretation or the applicability of items in this operating practice, the Project Manager or Technical Manager should be consulted. In the absence of either of those, contact your Section Manager.

3.0 REFERENCES

American Society for Testing and Materials (ASTM) Standards on Groundwater and Vadose Zone Investigation, 1992, pages 113-118.

Attachment: 1

ATTACHMENT 1

AMERICAN SOCIETY FOR TESTING AND MATERIALS DESIGNATION: D4750-87

American Society for Testing and Materials Designation: D4750-87

Standard Test Method for Determining Subsurface Liquid Levels in a Borehole or Monitoring Well (Observation Well)[1]

This standard is issued under the fixed designation D4750; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1.0 Scope

1.1 This test method describes the procedures for measuring the level of liquid in a borehole or well and determining the stabilized level of liquid in a borehole.

1.2 The test method applies to boreholes (cased or uncased) and monitoring wells (observation wells) that are vertical or sufficiently vertical so a flexible measuring device can be lowered into the hole.

1.3 Borehole liquid-level measurements obtained using this method will not necessarily correspond to the level of the liquid in the vicinity of the borehole unless sufficient time has been allowed for the level to reach equilibrium position.

1.4 This test method generally is not applicable for the determination of pore-pressure changes due to changes in stress conditions of the earth material.

1.5 This test method is not applicable for the concurrent determination of multiple liquid levels in a borehole.

1.6 The values stated in inch-pound units are to be regarded as the standard.

1.7 *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

[1] This test method is under the jurisdiction of ASTM Committee D-18 on Soil and Rock and is in direct responsibility of Subcommitte D18.02 on Sampling and Related Field Testing for Soil Investigations. Current edition approved Nov. 27, 1987. Published January 1988.

2.0 Referenced Document

2.1 *ASTM Standard:*
D653 Terminology Relating to Soil, Rock, and Contained Fluids[2] .

3.0 Terminology

3.1 *Descriptions of Terms Specific to This Standard:*

3.1.1 *borehole*—a hole of circular cross-section made in soil or rock to ascertain the nature of the subsurface materials. Normally, a borehole is advanced using an auger, a drill, or casing with or without drilling fluid.

3.1.2 *earth material*—soil, bedrock, or fill.

3.1.3 *ground-water level*—the level of the water table surrounding a borehole or well. The ground-water level can be represented as an elevation or as a depth below the ground surface.

3.1.4 *liquid level*—the level of liquid in a borehole or well at a particular time. The liquid level can be reported as an elevation or as a depth below the top of the land surface. If the liquid is ground water it is known as water level.

3.1.5 *monitoring well (observation well)*—a special well drilled in a selected location for observing parameters such as liquid level or pressure changes or for collecting liquid samples. The well may be cased or uncased, but if cased the casing should have openings to allow flow of borehold liquid into or out of the casing.

3.1.6 *stabilized borehole liquid level*—the borehole liquid level which remains essentially constant with time, that is, liquid does not flow into or out of the borehole.

3.1.7 *top of borehole*—the surface of the ground surrounding the borehole.

3.1.8 *water table (ground-water table)*—the surface of a ground-water body at which the water pressure equals atmospheric pressure. Earth material below the ground-water table is saturated with water.

[2] *Annual Book of ASTM Standards,* Vol 04.08.

3.2 Definitions:

3.2.1 For definitions of other terms used in this test method, see Terminology D653.

4.0 Significance and Use

4.1 In geotechnical, hydrologic, and waste-management investigations, it is frequently desirable, or required, to obtain information concerning the presence of ground water or other liquids and the depths to the ground-water table or other liquid surface. Such investigations typically include drilling of exploratory boreholes, performing aquifer tests, and possibly completion as a monitoring or observation well. The opportunity exists to record the level of liquid in such boreholes or wells, as the boreholes are being advanced and after their completion.

4.2 Conceptually, a stabilized borehole liquid level reflects the pressure of ground water or other liquid in the earth material exposed along the sides of the borehole or well. Under suitable conditions, the borehole liquid level and the ground-water, or other liquid, level will be the same, and the former can be used to determine the latter. However, when earth materials are not exposed to a borehole, such as material which is sealed off with casing or drilling mud, the borehole water levels may not accurately reflect the ground-water level. Consequently, the user is cautioned that the liquid level in a borehole does not necessarily bear a relationship to the ground-water level at the site.

4.3 The user is cautioned that there are many factors which can influence borehole liquid levels and the interpretation of borehole liquid-level measurements. These factors are not described or discussed in this test method. The interpretation and application of borehole liquid-level information should be done by a trained specialist.

4.4 Installation of piezometers should be considered where complex ground-water conditions prevail or where changes in intergranular stress, other than those associated with fluctuation in water level, have occurred or are anticipated.

5.0 Apparatus

5.1 Apparatus conforming to one of the following shall be used for measuring borehole liquid levels.

5.1.1 *Weighted Measuring Tape*—A measuring tape with a weight attached to the end.

The tape shall have graduations that can be read to the nearest 0.01 ft. The tape shall not stretch more than 0.05% under normal use. Steel surveying tapes in lengths of 50, 100, 200, 300, and 500 ft. (20, 30, 50 or 100 m) and widths of ¼ in. (6mm) are commonly used. A black metal tape is better than a chromium-plated tape. Tapes are mounted on hand-cranked reels up to 500 ft (100m) lengths. Mount a slender weight, made of lead, to the end of the tape to ensure plumbness and to permit some feel for obstructions. Attach the weight to the tape with wire strong enough to hold the weight but not as strong as the tape. This permits saving the tape in the event the weight becomes lodged in the well or borehole. The size of the weight shall be such that its displacement of water causes less than a 0.05-ft (15-mm) rise in the borehole water level, or a correction shall be made for the displacement. If the weight extends beyond the end of the tape, a length correction will be needed in measurement Procedure C (see 7.2.3).

5.1.2 *Electrical Measuring Device*—A cable or tape with electrical wire encased, equipped with a weighted sensing tip on one end and an electric meter at the other end. An electric circuit is completed when the tip contacts water; this is registered on the meter. The cable may be marked with graduations similar to a measuring tape (as described in 5.1.1).

5.1.3 *Other Measuring Devices*—A number of other recording and non-recording devices may be used. See Ref. (1) for more details[3].

6.0 Calibration and Standardization

6.1 Calibrate measuring apparatus in accordance with the manufacturers' directions.

7.0 Procedure

7.1 Liquid-level measurements are made relative to a reference point. Establish and identify a reference point at or near the top of the borehole or a well casing. Determine and record the distance from the reference point to the top of the borehole (land surface). If the borehole liquid level is to be reported as an elevation, determine the elevation of the reference point or the top of borehole (land surface). Three alternative measurement procedures (A, B, and C) are described.

Note 1---In general, Procedure A allows for greater accuracy than B or C , and B allows for greater accuracy than C; other procedures have a variety of accuracies that must be determined from the referenced literature (2-5).

7.2 *Procedure A—Measuring Tape:*

7.2.1 Chalk the lower few feet of tape by drawing the tape across a piece of colored carpenter's chalk.

7.2.2 Lower a weighted measuring tape slowly into the borehole or well until the liquid surface is penetrated. Observe and record the reading on the tape at the reference point. Withdraw the tape from the borehole and observe the lower end of the tape. The demarcation between the wetted and unwetted portions of the chalked tape should be apparent. Observe and record the reading on the tape at that point. The difference between the two readings is the depth from the reference point to the liquid level.

Note 2—Submergence of the weight and tape may temporarily cause a liquid-level rise in wells or boreholes having very small diameters. This effect can be significant if the well is in materials of very low hydraulic conductivity.

Note 3—Under dry surface conditions, it may be desirable to pull the tape from the well or borehole by hand, being careful not to allow it to become kinked, and reading the liquid mark before rewinding the tape onto the reel. In this way, the liquid mark on the chalked part of the tape is rapidly brought to the surface before the wetted part of the tape dries. In cold regions, rapid withdrawal of the tape from the well is necessary before the wet part freezes and becomes difficult to read. The tape must be protected if rain is falling during measurements.

Note 4—In some pumped wells, or in contaminated wells a layer of oil may float on the water. If the oil layer is only a foot or less thick, read the tape at the top of the oil mark and use this reading for the water-level measurement. The measurement will not be greatly in error because the level of the oil surface in this case will differ only slightly from the level of the water surface that would be measured if no oil was present. If several feet of oil are present in the well, or if it is necessary to know the thickness of the oil layer, a water-detector paste for detecting water in oil and gasoline storage tanks is available commercially. The paste is applied to the lower end of the tape that is submerged in the well. It will show the top of the oil as a wet line and the top of the water as a distinct color change.

7.2.3 As a standard of good practice, the observer should make two measurements. If two measurements of static liquid level made within a few minutes do not agree within about 0.01 or 0.02 ft (generally regarded as the practical limit of precision) in boreholes or wells having a depth to liquid of less than a couple of hundred feet, continue to measure until the reason for the lack of agreement is determined or until the results are shown to be reliable. Where water is dripping into the hole or covering its wall, it may be impossible to get a good water mark on the chalked tape.

7.2.4 After each well measurement, in areas where polluted liquids or ground water is suspected, decontaminate that part of the tape measure that was wetted to avoid contamination of other wells.

7.3 *Procedure B*—Electrical Measuring Device:

7.3.1 Check proper operation of the instrument by inserting the tip into water and noting if the contact between the tip and the water surface is registered clearly.

Note 5—In pumped wells having a layer of oil floating on the water, the electric tape will not respond to the oil surface and, thus, the liquid level determined will be different than would be determined by a steel tape. The difference depends on how much oil is floating on the water A miniature float-driven switch can be put on a two-conductor electric tape that permits detection of the surface of the uppermost fluid.

7.3.2 Dry the tip. Slowly lower the tip into the borehole or well until the meter indicates that the tip has contacted the surface of the liquid.

7.3.3 For devices with measurement graduations on the cable, note the reading at the reference point. This is the liquid-level depth below the reference point of the borehole or well.

7.3.4 For measuring devices without graduations on the cable, mark the cable at the reference point. Withdraw the cable from the borehole or well. Stretch out the cable and measure and record the distance between the tip and the mark on the cable by use of a tape. This distance is the liquid-level depth below the reference point.

7.3.5 A second or third check reading should be taken before withdrawing the electric tape from the borehole or well.

7.3.6 Decontaminate the submerged end of the electric tape or cable after measurements in each well.

Note 6—The length of the electric line should be checked by measuring with a steel tape after the line has been used for a long time or after it has been pulled hard in attempting to free the line. Some electric lines, especially the single line wire, are subject to considerable permanent stretch. In addition, because the probe is usually larger in diameter than the wire, the probe can become lodged in a well. Sometimes the probe can be attached by twisting the wires together by hand and using only enough electrical tape to support the weight of the probe. In this manner, the point of probe attachment is the weakest point of the entire line. Should the probe become "hung in the hole," the line may be pulled and breakage will occur at the probe attachment point, allowing the line to be withdrawn.

7.4 *Procedure C—Measuring Tape and Sounding Weight:*

7.4.1 Lower a weighted measuring tape into the borehole or well until the liquid surface is reached. This is indicated by an audible splash and a noticeable decrease in the downward force on the tape. Observe and note the reading on the tape at the reference point. Repeat this process until the readings are consistent to the accuracy desired. Record the result as the liquid-level depth below the reference point.

Note 7—The splash can be made more audible by using a "plopper," a lead weight with a concave bottom surface.

7.4.2 If the liquid level is deep, or if the measuring tape adheres to the side of the borehole, or for other reasons, it may not be possible to detect the liquid surface using this method. If so, use Procedure A or Procedure B.

8.0 Determination of a Stabilized Liquid Level

8.1 As liquid flows into or out of the borehole or well, the liquid level will approach, and may reach, a stabilized level. The liquid level then will remain essentially constant with time.

Note 8—The time required to reach equilibrium can be reduced by removing or adding liquid until the liquid level is close to the estimated stabilized level.

8.2 Use one of the following two procedures to determine the stabilized liquid level.

8.2.1 *Procedure 1*—Take a series of liquid measurements until the liquid level remains constant with time. As a minimum, two such constant readings are needed (more readings are preferred). The constant reading is the stabilized liquid level for the borehole or well.

Note 9—If desired, the time and level data could be plotted on graph paper in order to show when equilibrium is reached.

8.2.2 *Procedure 2* --- Take at least three liquid-level measurements at approximately equal time intervals as the liquid level changes during the approach to a stabilized liquid level.

8.2.2.1 The approximate position of the stabilized liquid level in the well or borehole is calculated using the following equation:

$$h_0 = \frac{y_1^2}{y_1 \quad y_2}$$

where:

h_0 = distance the liquid level must change to reach the stabilized liquid level,
y_1 = distance the liquid level changed during the time interval between the first two liquid-level readings, and
y_2 = distance the liquid level changed during the time interval between the second and the third liquid level readings.

8.2.2.2 Repeat the above process using successive sets of three measurements until the h_0 computed is consistent to the accuracy desired. Compute the stabilized liquid level in the well or borehole.

Note 10—The time span required between readings for Procedures 1 and 2 depends on the permeability of the earth material. In material with comparatively high permeability (such as sand), a few minutes may be sufficient. In materials with comparatively low permeability (such as clay), many hours or days may be needed. The user is cautioned that in clayey soils the liquid in the borehole or well may never reach a stabilized liquid level equivalent to the level in the earth materials surrounding the borehole or well.

9.0 Report

9.1 For borehole or well liquid-level measurements, report, as a minimum, the following information:

9.1.1 Borehole or well identification.

9.1.2 Description of reference point.

9.1.3 Distance between reference point and top borehole or land surface.

9.1.4 Elevation of top of borehole or reference point (if the borehole or well liquid level is reported as an elevation).

9.1.5 Description of measuring device used, and graduation.

9.1.6 Procedure of measurement.

9.1.7 Date and time of reading.

9.1.8 Borehole or well liquid level.

9.1.9 Description of liquid in borehole or well.

9.1.10 State whether borehole is cased, uncased, or contains a monitoring (observation) well standpipe and give description of, and length below top of borehole of, casing or standpipe.

9.1.1.1 Drilled depth of borehole, if known.

9.2 For determination of stabilized liquid level, report:

9.2.1 All pertinent data and computations.

9.2.2 Procedure of determination.

9.2.3 The stabilized liquid level.

9.3 *Report Forms*—An example of a GEOLIS Location Identification form is shown in Fig. 1. An example of a GEOLIS Water Level form, for recording continuing measurements for a borehole or well, is shown in Fig. 2.

10.0 Precision and Bias

10.1 Borehole liquid levels shall be measured and recorded to the accuracy desired and consistent with the accuracy of the measuring device and procedures used. Procedure A multiple measurements by wetted tape should agree within 0.02 ft (6 mm). Procedure B multiple measurements by electrical tape should agree within 0.04 ft (12 mm). Procedure C multiple measurements by tape and sounding weight should agree within 0.04 ft (12 mm). Garber and Koopman (2) describe corrections that can be made for effects of thermal expansion of tapes or cables and of stretch due to the suspended weight of tape or cable and plumb weight when measuring liquid levels at depths greater than 500 ft (150 m).

11.0 References

(1) N*ational Handbook of Recommended Method for Water Data Acquisition---Chapter 2---Ground Water"* Office of Water Data Coordination, Washington, DC, 1980.

(2) Garber, M.S., and Koopman, F.C., "Methods of Measuring Water Levels in Deep Wells, *"U.S. Geologic Survey Techniques for Water Resources Investigations,* Book 8, Chapter A-1, 1968.

(3) Hvorslev, M. J., "Ground Water Observations," in *Subsurface Exploration and Sampling of Soils for Civil Engineering Purposes.* American Society Civil Engineers, New York, NY 1949.

(4) Zegarra, E.J., "Suggested Method for Measuring Water Level in Boreholes," *Special Procedures for Testing Soil and Rock for Engineering Purposes,* ASTM STP 479, ASTM, 1970.

(5) "Determination of Water Level in a Borehole," CSA Standard A 119.6 - 1971, Canadian

Standards
Association, 1971.

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APPENDIX C

EDD SPECIFICATIONS

Table C-1
EDD Specifications

Pos #	Column Name	Data Type	Description
1	**SYS_SAMPLE_CODE**	Text (20)	Unique sample identifier. Each sample at a facility must have a unique value, including spikes and duplicates. (EPA Sample Number)
2	**SAMPLE_NAME**	Text (30)	Sample identifier shown on Chain of Custoday (Field Sample ID)
3	**SAMPLE_MATRIX_CODE**	Text (10)	Code which distinguishes between different types of sample matrix. Use values from Table A-2: Sample Matrix Valid Values
4	**SAMPLE_TYPE_CODE**	Text (10)	Code which distinguishes between different types of samples. For example normal samples must be distinguished from lab method blank samples. Use values from Table A-3: Sample Type Code Valid Values.
5	**SAMPLE_SOURCE**	Text (10)	This field identifies where the sample came from, either Field or Lab. In this case, this should always be Field.
6	PARENT_SAMPLE_CODE	Text (20)	The value of "sys_sample_code" that uniquely identifies the sample that was the source of this sample. For example, the value of this field for a duplicate sample would identify the normal sample of which this sample is a duplicate
7	**SAMPLE_DEL_GROUP**	Text (10)	EPA and their USEPA data providers are accustomed to using the CLP document definion of SDG. The CLP definition is more like a lab payment group, and is not the same as required by this specification.
8	**SAMPLE_DATE**	Date	Date sample was collected (in MM/DD/YYYY format)
9	SAMPLE_TIME	Time	Time of sample collection in 24-hr (military) HH:MM format
10	**SYS_LOC_CODE**	Text (20)	Soil boring or well installation location.
11	START_DEPTH	Number w/decimal precision upto 15	Beginning depth (top) of a sample in feet below ground surface. Leave null for most groundwater samples.
12	END_DEPTH	Number w/decimal precision upto 15	Ending depth (bottom) of sample in feet below ground surface. Leave null for most groundwater samples.
13	DEPTH_UNIT	Text (15)	Unit of measurment for the sample begin and end depths. Uses values from Table A-4: Unit Valid Values.
14	CHAIN_OF_CUSTODY	Text (15)	Chain of custody identifier. A single sample may be assigned to only one chain of custody
15	SENT_TO_LAB_DATE	Date	Date sample was sent to lab (in MM/DD/YY format for EDD).
16	SAMPLE_RECEIPT_DATE	Date	Date that sample was received at laboratory (in MM/DD/YY format for EDD).
17	SAMPLER	Text (30)	Name or initials of sampler
18	SAMPLING_COMPANY_CODE	Text (10)	Name or initials of sampling company. In this case, this should always be WESTON
19	SAMPLING_TECHNIQUE	Text (40)	Sampling Technique
20	TASK_CODE	Text (20)	Code used to identify the task number under which the field sample was retrieved. The format fro this field is XX-P#-##-##-####. Where XX is the type of task required (PR=PreRemedial, RI=Remedial Investigation, FS=Feasibility Study, PD=PreDesign, RD=Remedial Design, RA=Remedial Construction, PC=Post Construction, etc) and P# is the phasem ad ##_##_#### ist he date in month, day and year
21	**COMPOSITE_YN**	Text (1)	Is a sample composite sample? "Y" for Yes or "N" for No.
22	COMPOSITE_DESC	Text (255)	Description of composite sample if composite_yn is "Yes"
23	**LAB_ANL_METHOD_NAME**	Text (35)	Laboratory analytical method name or description. Use values from Table A-5: Lab Analytical Method Name Valid Values.
24	**ANALYSIS_DATE**	Date	Date of sample analysis in MM/DD/YYYY format.
25	**ANALYSIS_TIME**	Text (5)	Beginning time of sample analysis in 24-hr (military) HH:MM format.This field, combined with the "analysis_date" field is used to distinguish between retests and reruns (if reported). Please ensure that retests have "analysis_date" and/or "analysis_time" differ from the original test event and fill out the "test_type" field as needed.
26	**TOTAL_OR_DISSOLVED**	Text (1)	Must be either "D" for dissolved or filtered concentrations, or "T" for total concentrations, or "N" for Not Applicable.
27	**TEST_TYPE**	Text (10)	Type of test. Valid Values include, "initial", "reextract1", "reextract2", "reextract3", "reanalysis", "dilution1", "dilution2", and "dilution3"
28	**ANALYSIS_LOCATION**	Text (2)	Must be either "FI" for Field Instument or probe, "FL" for mobile field laboratory analysis, or "LB" for fixed_based laboratoy analysis.
29	**BASIS**	Text (10)	Must be either "Wet" for wet_weight basis reporting, "Dry" for dry_weight reporting, or "NA" for test for which this distinction is not applicable.

Table C-1
EDD Specifications

Pos #	Column Name	Data Type	Description
30	**DILUTION_FACTOR**	Number w/decimal precision upto 7	Effective test dilution factor.
31	PREP_METHOD_NAME	Text (35)	Laboratory sample prepartion method name or description. Use valid values from Table A-6: Prep Methods Valid Values
32	PREP_DATE	Date	Beginning date of sample prepartion in MM/DD/YYYY format.
33	PREP_TIME	Text (5)	Beginning time of sample prepartion in MM/DD/YYYY format.
34	LEACHATE_METHOD	Text (15)	Laboratory leachate generation method name or description.
35	LEACHATE_DATE	Date	Beginning date of leachate preparation in 24-hr (military) HH:MM format
36	LEACHATE_TIME	Text (5)	Beginning time of leachate prepartion in MM/DD/YYYY format.
37	**LAB_NAME_CODE**	Text (10)	Unique identifier of the laboratory as defined by the EPA. Use valid values from Table A-7: Lab Name Code Valid Values
38	**QC_LEVEL**	Text (10)	May be either "Screen" or "Quant"
39	**LAB_SAMPLE_ID**	Text (20)	Laboratory LIMS sample identifier.
40	PERCENT_MOISTURE	Text (5)	Percent Moisture of the sample portion used in the test; this value may vary from test to for any sample. Numeric format is "NN.MM", ie., 70.1% should be reported at "70.1" but not as "70.1%".
41	SUBSAMPLE_AMOUNT	Text (14)	Amount of sample used for test.
42	SUBSAMPLE_AMOUNT_UNIT	Text (15)	Unit of measurement for subsample amount. Use valid values from Table A-4: Unit Valid Values
43	PRESERVATIVE	Text (50)	Sample preservative used.
44	FINAL_VOLUME	Text (15)	The final volume of the sample after sample prepartion. Include all dilution factors.
45	FINAL_VOLUME_UNIT	Text (15)	The unit of measurement that corresponds to the final_amount.
46	**CAS_RN**	Text (15)	Use values in Table A-8: Analyte Valid Values
47	**CHEMICAL_NAME**	Text (60)	Use values in Table A-8: Analyte Valid Values
48	RESULT_VALUE	Text (20)	Analytical result reported and appropriate number of significant digits.
49	RESULT_ERROR_DELTA	Text (20)	Error range applicable to the result value; typically used only for a diochemistry result.
50	**RESULT_TYPE_CODE**	Text (10)	Must be either "TRG" for a target or regular result, "TIC" for tentatively identifed compounds, "SUR" for surrogates, "IS" for internal standards, or "SC" for spiked compounds.
51	**REPORTABLE_RESULT**	Text (10)	Must be either "Yes" for results which are considered to be reportable, or "No" for other results. This field has many purposes. For example, it can be used to distinguish bewtween multiple results where a sample is retested after dilution. It can also be used to indicate which of the first or second column result should be considered primary. The proper value of this field in both of these samples should be provided by the laboratory (only one result should be flagged as reportable).
52	**DETECT_FLAG**	Text (2)	May be either "Y" for detected analytes or "N" for non_detects. Use "Y" for estimated (above detion limit but below the quanition limit) or ">" and "<" for tests such as flash point. Note that "<" must not be used to indicate non-detects.
53	LAB_QUALIFIERS	Text (7)	Qualifier flags assigned by the laboratory. Must use valid values from Table 9: Qualifiers Valid Value Table
54	VALIDATOR_QUAILIFIERS	Text (7)	Qualifier flags assigned by the validator. Must use valid values from Table 9: Qualifiers Valid Value Table
55	**ORGANIC_YN**	Text (1)	Must be either "Y" for orgainc consituents or "N" for inorganic constituents.
56	REPORTING_DETECTION_LIMIT	Text (20)	Concentration levels above which results can be quantified with confidence. It must reflect conditions such as dilution factors and moisture content. Must be reported as the sample specific detection limit.
57	**RESULT_UNIT**	Text (15)	Units of measurement for the result. Use valid values from Table A-4: Unit Valid Values
58	DETECTION_LIMIT_UNIT	Text (15)	Units of measurement for the detection limit. Use valid values from Table A-4: Unit Valid Values.
59	RESULT_COMMENT	Text (255)	Result specific comments.